THE RESOURCES AGENCY OF CALIFORNIA

Department of Water Resources

BULLETIN No. 66-60

QUALITY OF GROUND WATERS IN CALIFORNIA 1960

PART II SOUTHERN CALIFORNIA

APRIL 1964

HUGO FISHER
Administrator
The Resources Agency of California

EDMUND G. BROWN
Governor
State of California

WILLIAM E. WARNE
Director
Department of Water Resources

State of California
THE RESOURCES AGENCY OF CALIFORNIA
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SOUTHERN CALIFORNIA

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THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
LOS ANGELES

January 24, 1964

Honorable Edmund G. Brown, Governor,
and Members of the Legislature of
the State of California

State Water Quality Control Board

Gentlemen:

I have the honor to transmit Bulletin No. 66-60 entitled "Quality of Ground Waters in California, 1960, Part II, Southern California." This report covers the period January through December 1960. The quality of ground waters in Northern and Central California is discussed in Part I of this bulletin.

This is the sixth in a continuing series of reports on the ground water quality monitoring program conducted by the Department of Water Resources. Under this program, water samples from representative wells in ground water basins throughout the State are collected and analyzed, and an annual evaluation of ground water quality conditions is made. Mineral and radiological analyses were made of ground water samples taken from approximately 180 wells in 16 monitored areas in Southern California.

Less than normal precipitation in the 1959-1960 rainfall season and the consequent greater utilization of ground water intensified existing problems of impairment of ground water quality in the areas monitored in Southern California during 1960. Sea-water intrusion, connate water encroachment, and returns of waste water to the underground basins continued to exhibit local effects of degradation on ground water quality.

Sincerely yours,

William E. Warne

Director

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

EDMUND G. BROWN, Governor
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ACKNOWLEDGMENT

The broad coverage of the statewide ground water quality monitoring program is made possible through the combined efforts of many public and private agencies. Although the program was initiated by the Department of Water Resources, the present scope of the program could not have been achieved without the valuable assistance of these other agencies. The generous and valuable assistance of the following agencies is gratefully acknowledged:

United States Geological Survey

California Department of Public Health, Bureau of Sanitary Engineering

California Disaster Office, Radiological Service

Long Beach City, Water Department

Los Angeles County Flood Control District

Orange County Air and Water Pollution Control Committee

Riverside County Flood Control and Water Conservation District

San Bernardino County Flood Control District

San Luis Obispo County Flood Control and Water Conservation District

Ventura County Department of Public Works

THE GROUND WATER QUALITY MONITORING PROGRAM

Water development to meet the needs of California's phenomenal growth during the past decade has beome one of the major problems facing the State. As the water resources of California are more fully utilized to meet the requirements imposed by the rapid expansion in population, agriculture, and industry, and as the number of suitable surface storage sites dwindles, water development planners are turning more and more to ground water supplies. Although the use of ground water has been, and is, one of the major factors contributing to the economy of the State, generally insufficient data are available regarding the mineral quality of such ground water supplies. The present widespread dependence upon ground water, together with the need for more intensive utilization of underground storage, requires constant vigilance coupled with remedial action, where necessary, to assure that the quality of ground water remains suitable for all intended uses.

In view of the extensive occurrence of ground water and its relatively slow rate of movement, determination of ground water quality and detection of changes therein require reliable long-term observation and records. Such data are essential to any program of quality control and are indispensable to formulation of plans for the coordinated operation of surface and underground storage. To help meet this need, a statewide program of observation and study of ground water quality was initiated by the Department of Water Resources in 1953 under the authority of Section 229 of the California Water Code.

Section 229 of the California Water Code directs that the department shall:

> "...investigate conditions of the quality of all waters within the State, including saline waters, coastal and inland, as related to all sources of pollution of whatever nature and shall report thereon to the Legislature and to the appropriate regional water pollution control board annually, and may recommend any steps which might be taken to improve or protect the quality of such waters."

Accordingly, the objectives of the ground water quality monitoring program are:

1. To provide information on the prevailing mineral quality of ground waters;
2. To provide a reliable, continuing check on quality of ground waters;
3. To secure data relating to significant changes in mineral quality, to evaluate the causes for these changes and to identify and delineate the areas affected by such changes;
4. To notify the appropriate regulatory agencies regarding the findings of the program.

Part I of this bulletin presents data on, and an evaluation of, ground water quality conditions in Northern and Central California for the period January through December 1960. The area covered in Part I comprises all of Water Pollution Control Regions 1,2, and 5; Region 3 north of the San Antonio-Salinas River drainage boundary; and Region 6 north of the northern Mono Lake drainage boundary. Part II presents data on, and an evaluation of, ground water quality conditions in Region 3, south of the San Antonio-Salinas River drainage boundary; Region 6, south of the northern Mono Lake drainage boundary; and all of Regions 4,7,8, and 9. The areas of Southern California monitored during the 1960 program are shown on Plate 1, "Monitored Areas, 1960."

In establishing the areas included within the ground water quality monitoring program, requests and suggestions from regional water pollution control boards and other interested water agencies have been considered. During 1960, ground water samples taken from about 180 wells in 16 ground water basins in Southern California were collected and analyzed. The geographical location and areal extent of each of the monitored areas is indicated on Plate 1.

The selection of the individual wells sampled is governed, to a large extent, by the availability of well logs. Sufficient information, such as depth, aquifers encountered, and depths of perforations is desirable for each sampled well to assure that data obtained are useful. Wells are added to, or deleted from, the well monitering network according to changing ground water conditions in an area. For example, a well showing prominent effects of sea-water intrusion is generally removed from productive use and, in many instances, sampling becomes impracticable. Accordingly, another well is substituted, if available.

Tests made of ground water quality include mineral and radiological determinations. The frequency of sampling, type of analysis, and density of the sampling network for mineral tests depend largely on the conditions in the area being monitored. In areas where water quality problems are known to exist and where extensive use is made of ground water supplies, samples are taken one or more times each year. In areas where limited use is made of ground waters, samples are taken periodically until sufficient data are collected to determine the water quality of the basin and thereafter as frequently as the land development and water use warrants.

Radioassays of well waters are made annually. In general, only the minimum number of wells necessary to show the areal extent of problems, if any, or to evaluate ground water conditions, are included in the radiological monitoring network.

In this report the monitored areas are grouped for purposes of discussion by water pollution control board regions, the boundaries of which, in most cases, coincide with those of the major drainage basins of the State. Within these regions the monitored areas are identified by basin numbers which provide quick data reference and permit machine processing of the data. The identifying basin numbers used in this report are based on a decimal system in the form 0-00.00. The number to the left of the dash refers to the water pollution control board region within which the basin is located. On the right of the dash the first digit or digits refer to the basin, valley, or area. Digits to the right of the decimal, if any, refer to the subbasin number as shown below.

```
0-00.00
| |  |_______ subbasin
| |__________ basin, valley, or area
|____________ water pollution control board region
```

It should be noted that a "monitored area" is defined as that portion of a ground water basin which lies generally within the limits of an established network of monitored wells. It does not necessarily include the entire ground water basin.

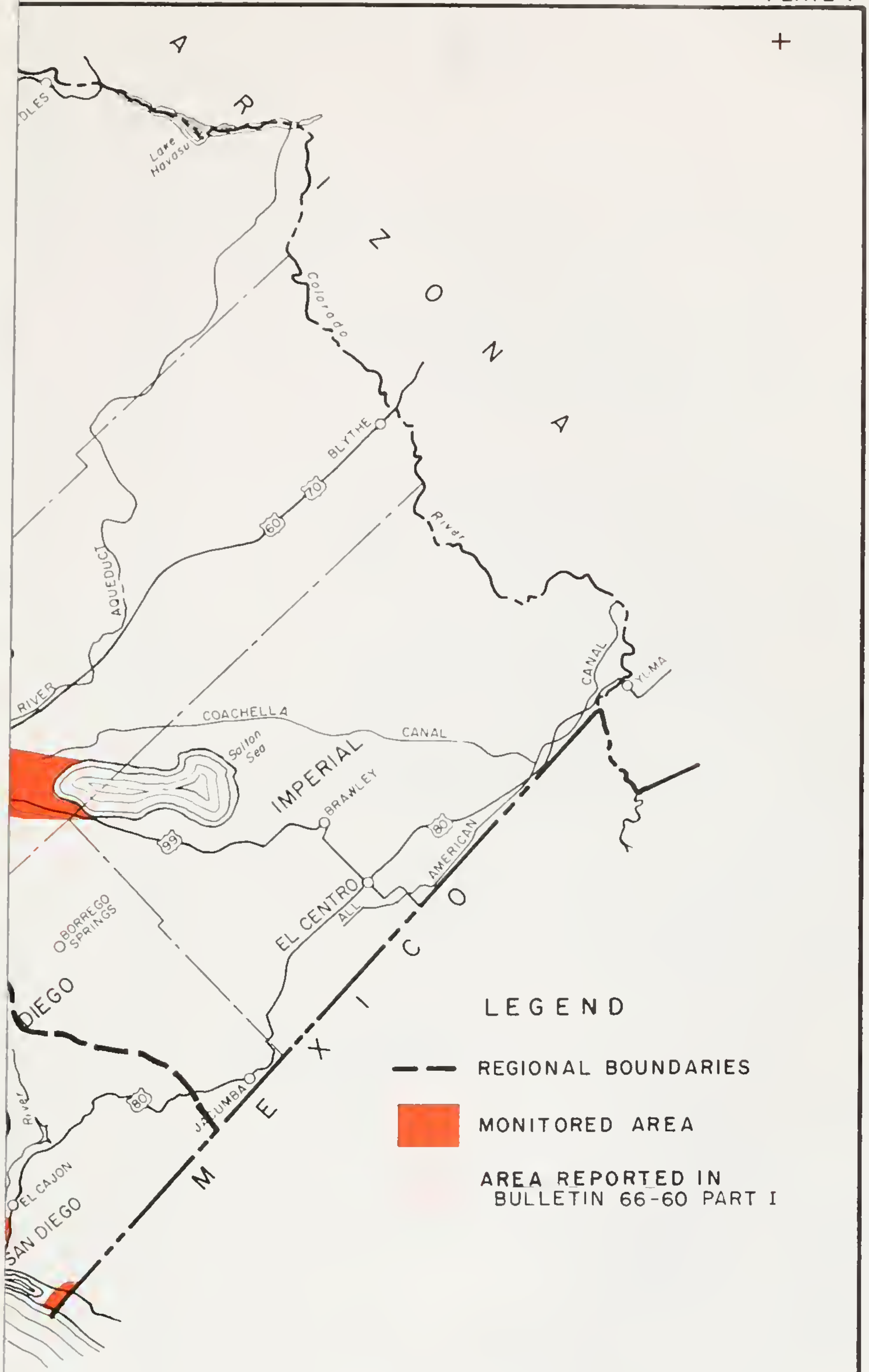
Wells selected for inclusion in the ground water quality monitoring network are assigned numbers by township, range, and section, based upon their location. The numbering system is the same as that utilized by the United States Geological Survey. Under this system each section is divided into 40-acre plots, which are lettered as follows:

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Wells are numbered within each of these 40-acre plots according to the order in which they are located. For example, a well having a number 3N/6E-24A2 is located in Township 3 North, Range 6 East, and in Section 24. It is further described as the second well identified in the 40-acre plot lettered A.

The information presented in the text that follows for each monitored area includes: a brief description of the area and the monitoring program; the occurrence, development, and beneficial uses of ground water; a discussion of major waste discharges; and an evaluation of any significant changes in ground water quality. Following the presentation for each area, a graph shows conductivity and problem constituent ranges and, where meaningful, graphs of fluctuations of problem constituents in selected wells. A map of the monitored area shows monitored well locations and known area of ground water degradation.

Following the discussions of the monitored areas are two appendixes that present detailed information on procedures and analyses. Appendix A presents discussions of types of mineral analyses employed in the monitoring program, of laboratory methods and procedures used, and criteria for appraising the suitability of water for drinking, irrigation, and industrial uses. Appendix B presents tabulations of all mineral analyses of samples collected in this program during 1960, and available data on ground water monitoring wells.



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS
IN CALIFORNIA, 1959
PART II SOUTHERN CALIFORNIA

MONITORED AREAS
1960

SCALE OF MILES
10 0 10 20 30 40 50

1963

INDEX TO MONITORED AREAS

CENTRAL COASTAL REGION (NO. 3)

3-12 SANTA MARIA RIVER VALLEY
3-13 CUYAMA RIVER VALLEY

LOS ANGELES REGION (NO. 4)

4-4.01 OXNARD PLAIN PRESSURE AREA
4-11.02 WEST COAST BASIN
SANTA MONICA BAY AREA
HAWTHORNE-GARDENA AREA
TORRANCE AREA
4-11.03 CENTRAL BASIN PRESSURE AREA
4-11.04 AND LOS ANGELES FORBAY AREA
4-13.01 MAIN SAN GABRIEL BASIN

LAHONTAN REGION (NO. 6)

6-40 LOWER MOJAVE RIVER VALLEY, BARSTOW TO YERMO

COLORADO RIVER BASIN REGION (NO. 7)

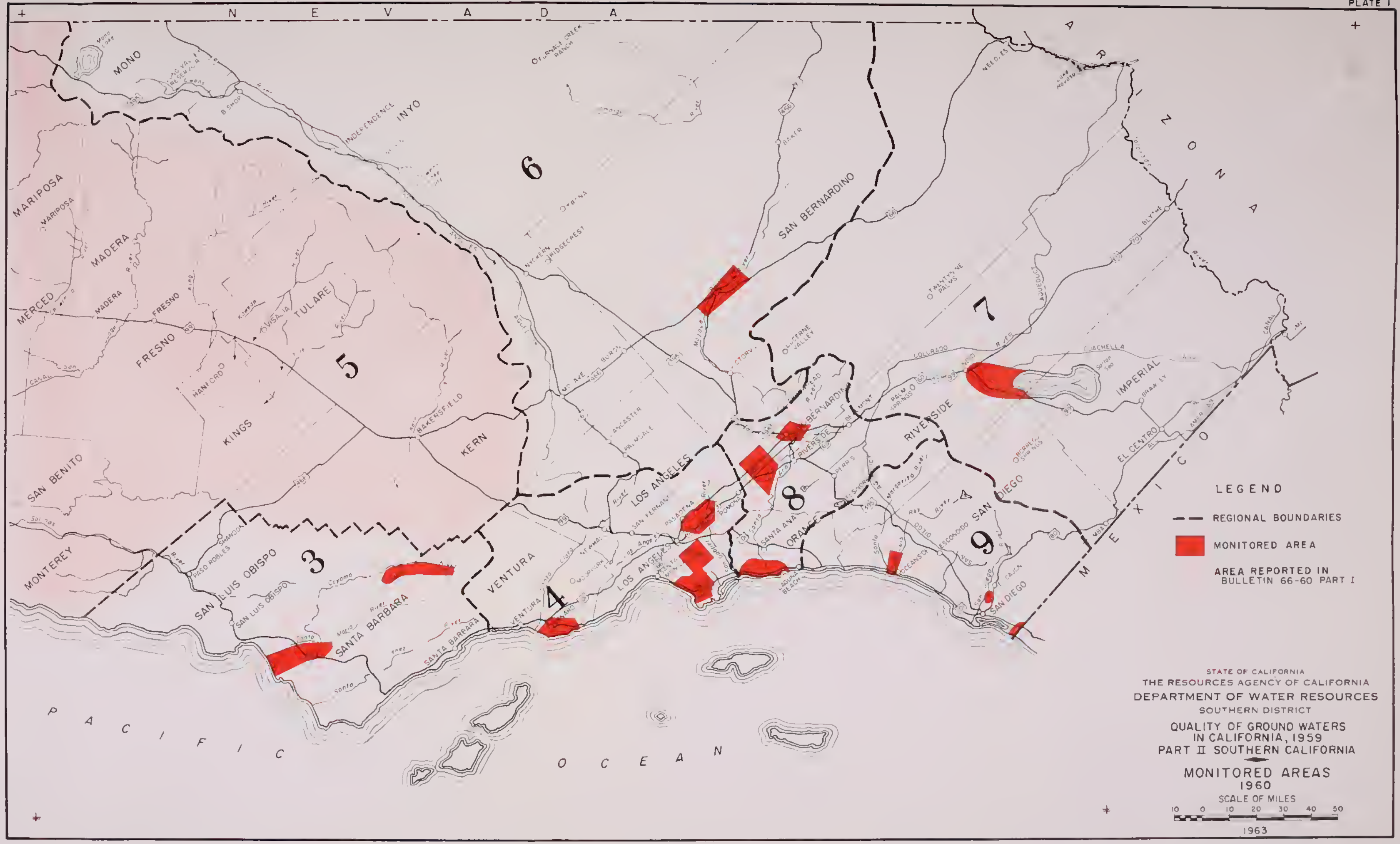
7-21 COACHELLA VALLEY (SOUTH END)

SANTA ANA REGION (NO. 8)

8-1.01 ANAHEIM BASIN PRESSURE AREA
8-2.01 CHINO BASIN
8-2.06 BUNKER HILL BASIN

SAN DIEGO REGION (NO. 9)

9-7.01 SAN LUIS REY VALLEY, MISSION BASIN
9-16 EL CAJON VALLEY
9-19 TIA JUANA VALLEY BASIN



QUALITY OF GROUND WATERS IN SOUTHERN CALIFORNIA, 1960

The mineral quality of ground water in Southern California during 1960 reflected the much below normal rainfall in the 1958-1959 and 1959-1960 precipitation seasons. The improvement in ground water quality noticeable in some basins following the more plentiful rainfall in the 1957-1958 season, was later reversed by quality changes induced by the dry weather.

Increased demands on ground water supplies due to lack of rain was accompanied by a general lowering of ground water levels. The lowered water tables, or pressure surfaces, accentuated previously existing degradational effects on water quality exerted by sea-water intrusion, by inflow of poor quality waters from rocks and sediments adjacent to or underlying some valley fill areas, and by discharges of waste waters to areas susceptible to percolation of these wastes to the underlying ground water bodies. No new sources of degradation were discovered during 1960.

Considerable quantities of imported water were used to augment ground water supplies in 1960. The influence of the imported water on the ground water quality was evident in several monitored areas in Regions 4, 7, and 8.

QUALITY OF GROUND WATERS
IN SOUTHERN CALIFORNIA, 1960

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Central Coastal Region (No. 3)

The Central Coastal Region includes all of the coastal drainage areas from the southern boundary of Pescadero Creek Basin in San Mateo County to the southeastern boundary of Rincon Creek Basin in Ventura County as shown on Plate 1. It extends inland an average of about 50 miles to the crest of the coastal mountain ranges, and encompasses an area of approximately 11,000 square miles. The region is characterized by narrow coastal plains and coastal valleys with moderate slopes toward the ocean, backed by rugged mountain ranges paralleling the coast.

During the 1959-60 rainfall season, Region 3 received only 68 percent of its 50-year mean precipitation and ground water levels have dropped slightly.

Valley areas in this region depend largely on ground water as a source of supply, and approximately 90 percent of the water requirements are met by ground water pumping. Nineteen ground water basins have been identified in this region, of which 18 are utilized intensively to supply irrigation water. Six ground water basins in this region have been included in the statewide ground water monitoring program. These areas, the number of monitored wells in each, and the sampling times are listed in the following tabulation.

Monitored area	Number of wells	Sampling time
Pajaro Valley (3-2)*		
Gilroy-Hollister Basin (3-3)*		
Salinas Valley (3-4)*		
Carmel Valley (3-7)*		
Santa Maria River Valley (3-12)	20	April and September
Cuyama River Valley (3-13)	12	July and September

* These ground water basins are located in Northern and Central California and are discussed in Part I of this bulletin.

The quality of ground water in the monitored areas covered by Part II of this report showed no significant variations in 1960 in comparison with previously existing conditions.

Santa Maria River Valley (3-12)

The Santa Maria River Valley is located along the San Luis Obispo and Santa Barbara County line; its boundaries are shown on Plate 2, "Santa Maria River Valley." The basin extends 28 miles inland from the ocean and includes an area of about 180 square miles. It is traversed by the Santa Maria and Sisquoc Rivers.

Ground Water Occurrence. The chief sources of ground water are the unconsolidated sediments of Pleistocene and Recent age; namely, the Paso Robles formation, the Orcutt formation, and the Recent alluvium. Santa Maria River Valley Basin is a free ground water basin except in the western portion, where sufficient fine-grained alluvium accumulated to form a confining cap. Waters overlying the confining cap are either perched or semiperched. Well yields are low near the perimeter of the valley, increasing toward the center. Yields from wells range from less than 100 to 3,000 gpm and average about 1,000 gpm.

Ground Water Development and Use. Ground water is extensively developed in Santa Maria River Valley and supplies all water requirements for irrigation, domestic, and industrial uses.

Major Waste Discharges. Brine wastes from oil production and effluents from sewage treatment plants constitute the major waste discharges in the Santa Maria Valley. Although almost all of the oil field brine wastes are discharged to the ocean by pipeline, the possibility of pollution of ground water by oil wastes through spillage, defective casings, or permeable sumps still remains. All of the sewage effluents in this area are discharged to ponds from which some is used for irrigation. The effluents are discharged in an area of high permeability and constitute an involuntary replenishment of the free ground water body.

Monitoring Program. The monitoring program was initiated in this area in 1953 to detect changes in ground water quality which might result from surface disposal of oil industry wastes. Sampling well coverage originally encompassed practically all water wells in the areas of oil production, which are located in the eastern or upper end of the valley. In 1957, wells in the coastal region were added to monitor an area where sea-water intrusion may become a problem. Under a cooperative arrangement between the department and the United States Geological Survey initiated in 1957, the Geological Survey assumed the task of ground water sampling. In 1960, 24 analyses were obtained from 20 monitored wells.

Evaluation of Water Quality. Analyses of ground water from Santa Maria River Valley wells in 1960 indicated a nearly uniform character of water throughout the basin, predominantly calcium-magnesium sulfate in type. The waters were exceedingly hard, and sulfates usually greatly exceeded the recommended limit of 250 ppm for drinking water. Analyses of ground water from wells located in the coastal region of the Santa Maria River Valley Basin failed to show evidence of sea-water intrusion in 1960. There was, however, a rather widespread area of high nitrate ground waters in the central portion of the basin west of the City of Santa Maria. In the area around the City of Guadalupe, high values for total dissolved solids, sulfates, and total hardness were found. The ground waters are class 1 to class 2 for irrigation. Ranges for significant mineral constituents in 1960 were as follows:

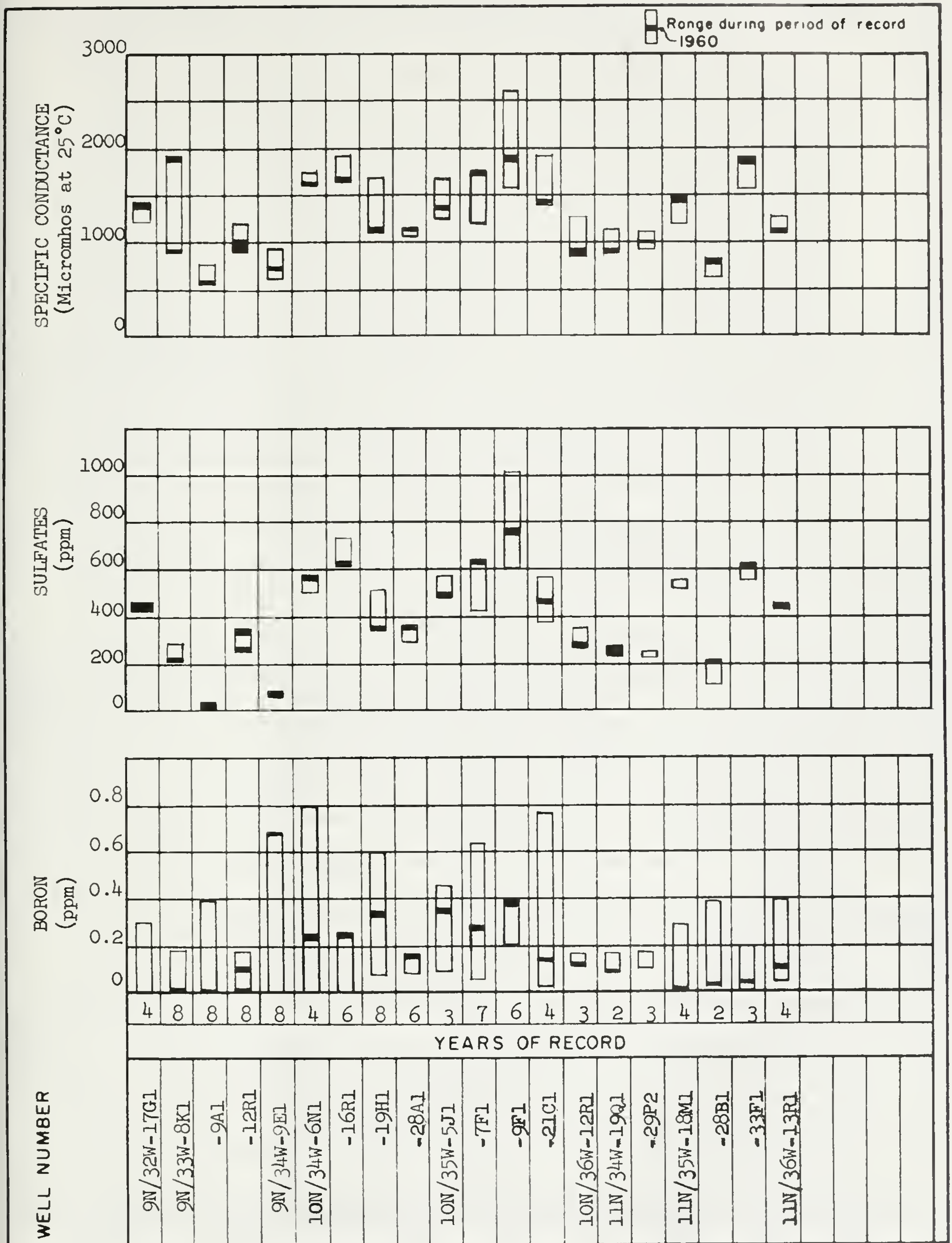
	High	Median	Low	
Total dissolved solids	1,582	770	375	ppm
Chlorides	145	65	29	ppm
Sulfates	783	348	8	ppm
Total hardness	945	517	84	ppm
Boron	0.72	0.15	0.01	ppm
Nitrates	73	12	1.5	ppm
Percent sodium	36*	22	13	

Significant Water Quality Changes. Comparison of 1960 analyses with those of the preceding years indicates fluctuations in mineral content of ground water during the eight-year period, with little indication of a basin-wide trend. The basin received 88 percent of its 50-year mean precipitation and water levels dropped in 1960. In spite of this, water from only a few wells changed slightly in one or two mineral constituents.

Water from well 10N/34W-6N1, located approximately four miles west of the City of Santa Maria, has increased in fluoride from 0.38 ppm in 1959 to 1.1 ppm in 1960 but has decreased in nitrates. Water from well 10N/34W-16R1, located approximately one mile southwest of the City of Santa Maria, has also increased in fluoride, to a lesser degree, but has increased sharply in nitrates from 47 ppm in 1959 to 73 ppm in 1960. Water from well 10N/35W-7F1, located approximately two miles west of the City of Guadalupe,

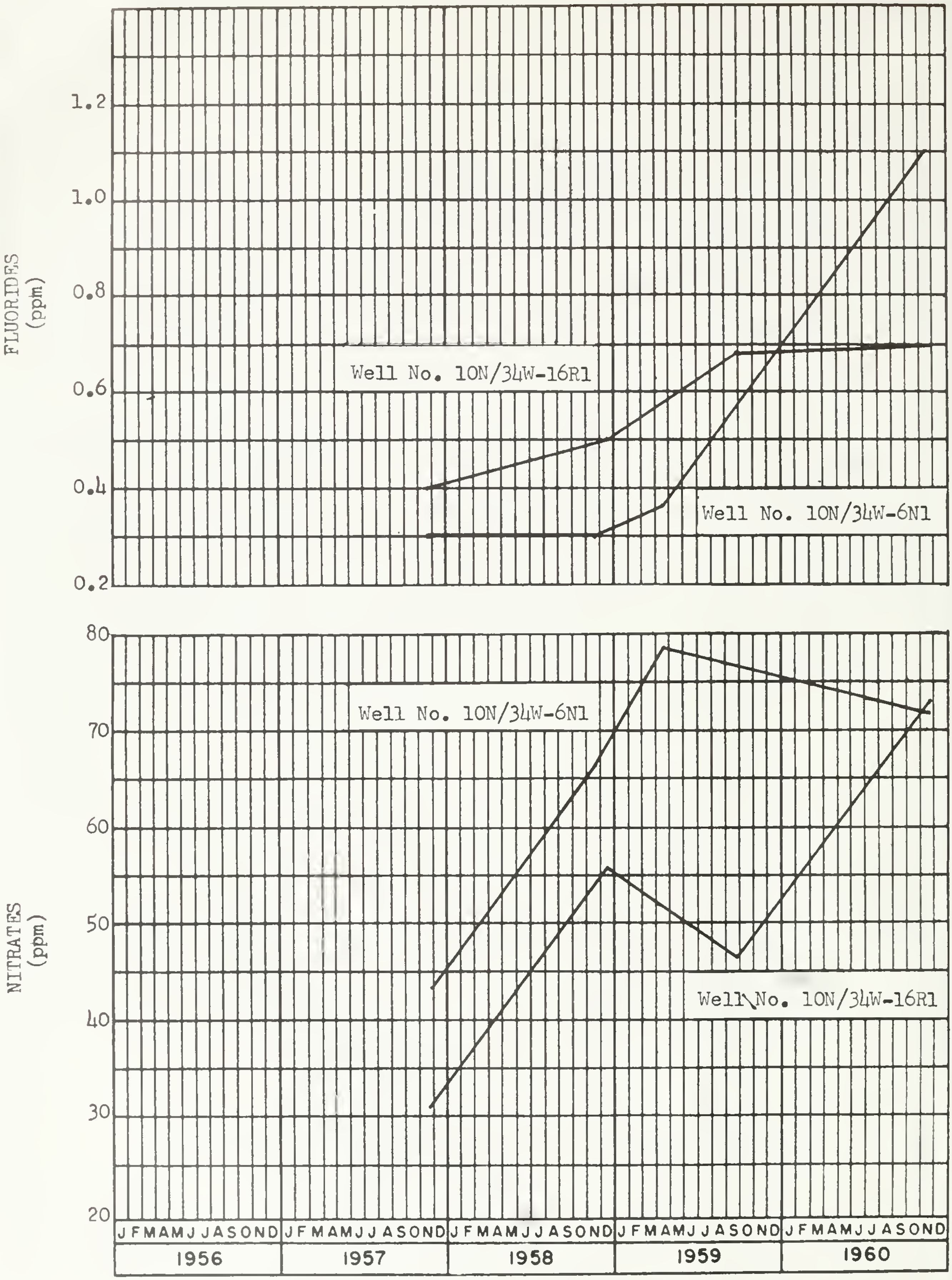
* Excluding the analysis of water from well 9N/33W-9A1, located approximately four miles east of the City of Orcutt, which showed 65 and 68 percent sodium. This well supplies water of good quality which is used for domestic purposes.

has generally increased in mineral constituents since 1958 and over its period of record. The most notable increases have been in sulfates, 456 ppm in 1954 to 586 in 1958 to 643 in 1960; in chloride, 69 ppm in 1954 to 100 in 1958 to 102 in 1960; and in total hardness, 630 ppm in 1954 to 746 ppm in 1958 to 837 ppm in 1960. A complete analysis of this well was not made in 1959. Analyses of water from well 10N/34W-19H1, located approximately two miles northeast of Betteravia has improved over the 1959 analyses in total dissolved solids, from 1,180 ppm to 936 ppm; and in chlorides, from 97 ppm to 44 ppm. There is no area where boron concentration causes a problem although water from well 9N/34W-9E1, located approximately 1.5 miles northwest of Orcutt, showed an increase from 0.19 ppm in 1950 to 0.72 ppm in 1960.



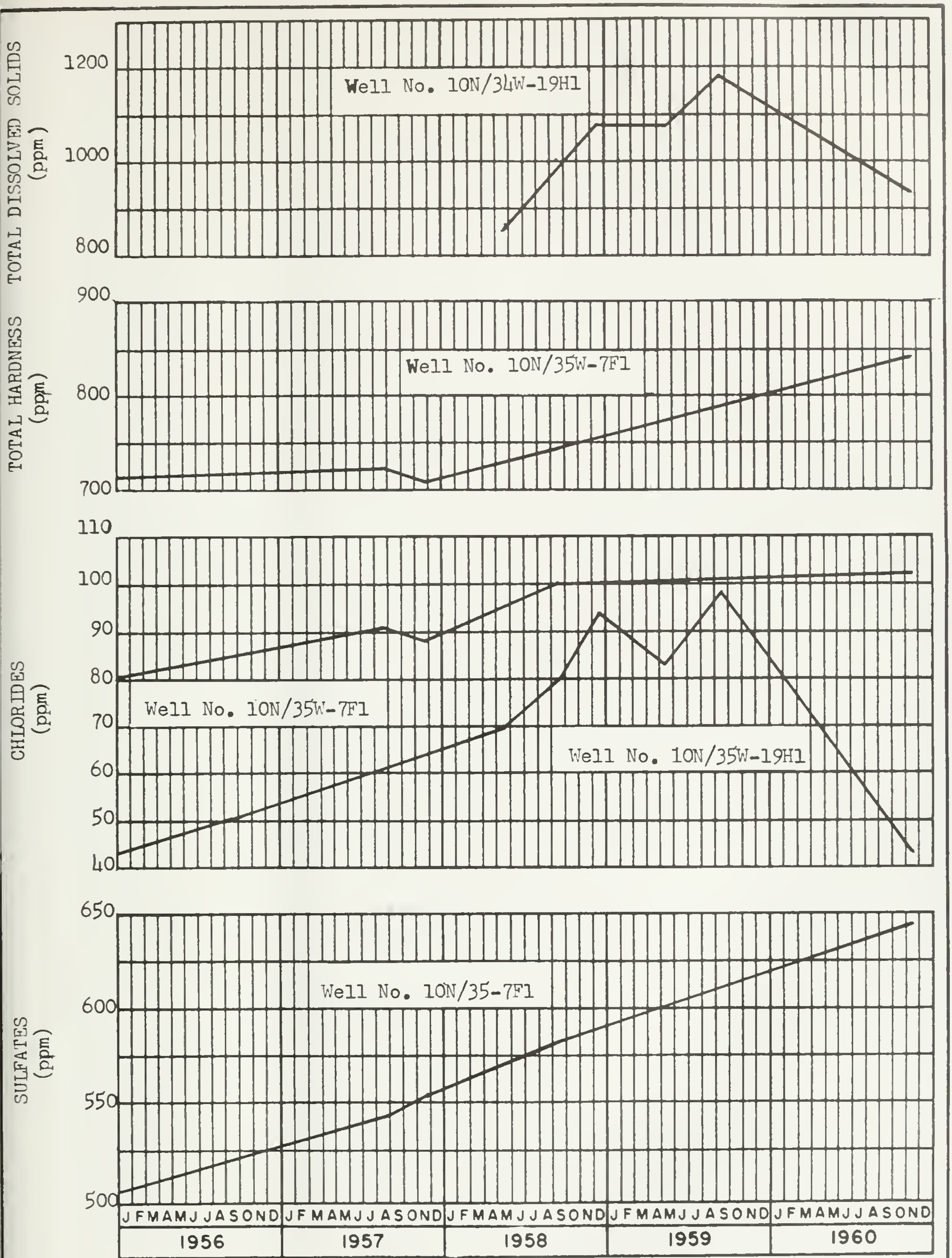
WATER QUALITY RANGES

SANTA MARIA RIVER VALLEY



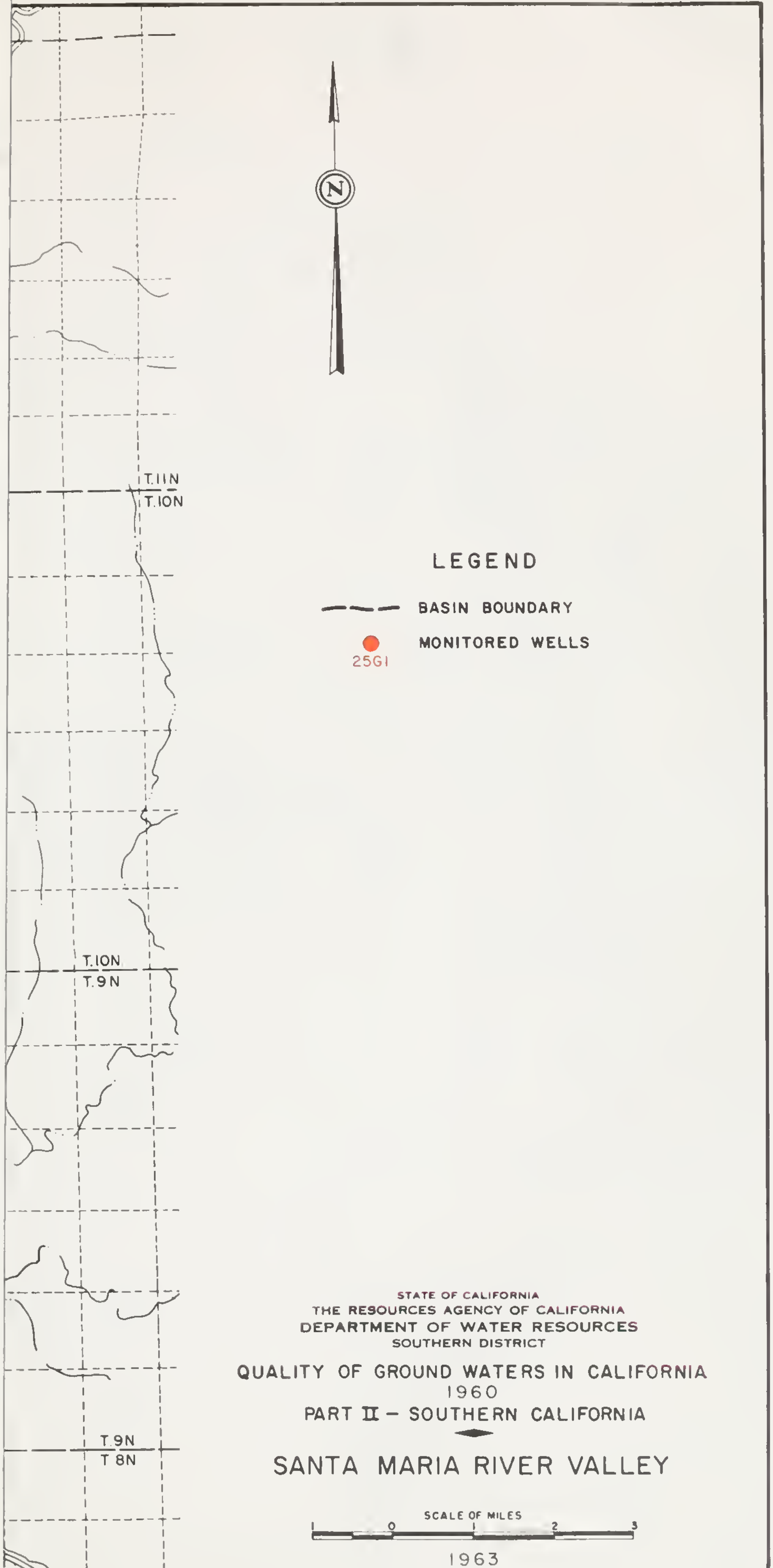
FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

SANTA MARIA RIVER VALLEY



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

SANTA MARIA RIVER VALLEY



LEGEND

BASIN BOUNDARY

MONITORED WELLS
25G1

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

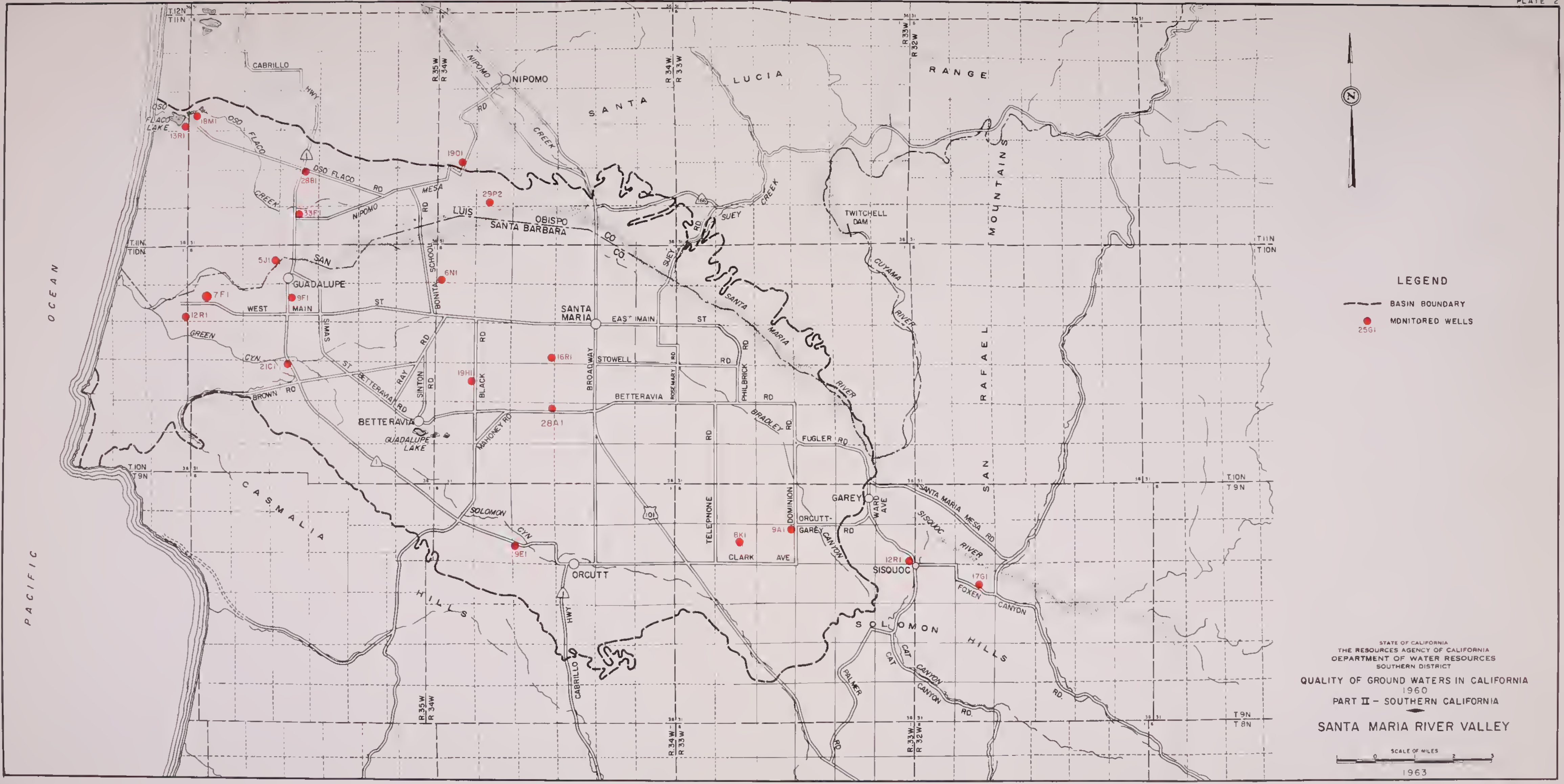
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA

SANTA MARIA RIVER VALLEY

SCALE OF MILES
1 0 1 2 3

1963

PLATE 2


LEGEND
BASIN BOUNDARY
MONITORED WELLS
25G1
STATE OF CALIFORNIA
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QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II - SOUTHERN CALIFORNIA
SANTA MARIA RIVER VALLEY
SCALE OF MILES
0 1 2 3
1963
PACIFIC
OCEAN
SANTA LUCIA RANGE
SAN RAFAEL MOUNTAINS
CASMALIA HILLS
SOLOMON HILLS
NIPOMO
GUADALUPE
SANTA MARIA
BETTERAVIA
ORCUTT
GAREY
SISQUOC
TWITCHELL DAM
GUADALUPE LAKE
OSO FLACO LAKE
18M1
13R1
28B1
33F1
19O1
29P2
5J1
7F1
9F1
12R1
6N1
21C1
16R1
19H1
28A1
19E1
8K1
9A1
12R1
17G1

Cuyama River Valley (3-13)

The Cuyama Valley ground water basin is located along the Cuyama River in the southeast corner of San Luis Obispo County and the northeast corner of Santa Barbara County, as shown on Plate 3, "Cuyama River Valley." This basin includes portions of Kern and Ventura Counties also. The basin extends about 35 miles along the Cuyama River ranging in width from one to four miles and encompasses about 125 square miles.

Ground Water Occurrence. Unconsolidated clay, silt, and gravel, 3,000 to 4,000 feet in total thickness, compose the alluvium, terrace, and older continental deposits that supply nearly all the ground water in this area. The alluvium of Recent origin is most important in the western part of the basin, whereas the older deposits are important in the eastern portion; however, many wells are perforated in both. Except for small areas in the south central part, the ground waters are considered to be unconfined. Well yields range from less than 600 gpm to 4,400 gpm and average about 1,000 gpm. The yield of wells is least in the south central portion of the valley, while the higher yields are obtained from wells in the older continental deposits in the eastern portion of the basin.

Ground Water Development and Use. Ground water in the Cuyama Valley has been extensively developed for irrigation needs. More recently, minor development has taken place for relatively new oil industry and expanding domestic requirements. Ground water supplies most of the local needs.

Cuyama River Valley (3-13)

The Cuyama Valley ground water basin is located along the Cuyama River in the southeast corner of San Luis Obispo County and the northeast corner of Santa Barbara County, as shown on Plate 3, "Cuyama River Valley." This basin includes portions of Kern and Ventura Counties also. The basin extends about 35 miles along the Cuyama River ranging in width from one to four miles and encompasses about 125 square miles.

Ground Water Occurrence. Unconsolidated clay, silt, and gravel, 3,000 to 4,000 feet in total thickness, compose the alluvium, terrace, and older continental deposits that supply nearly all the ground water in this area. The alluvium of Recent origin is most important in the western part of the basin, whereas the older deposits are important in the eastern portion; however, many wells are perforated in both. Except for small areas in the south central part, the ground waters are considered to be unconfined. Well yields range from less than 600 gpm to 4,400 gpm and average about 1,000 gpm. The yield of wells is least in the south central portion of the valley, while the higher yields are obtained from wells in the older continental deposits in the eastern portion of the basin.

Ground Water Development and Use. Ground water in the Cuyama Valley has been extensively developed for irrigation needs. More recently, minor development has taken place for relatively new oil industry and expanding domestic requirements. Ground water supplies most of the local needs.

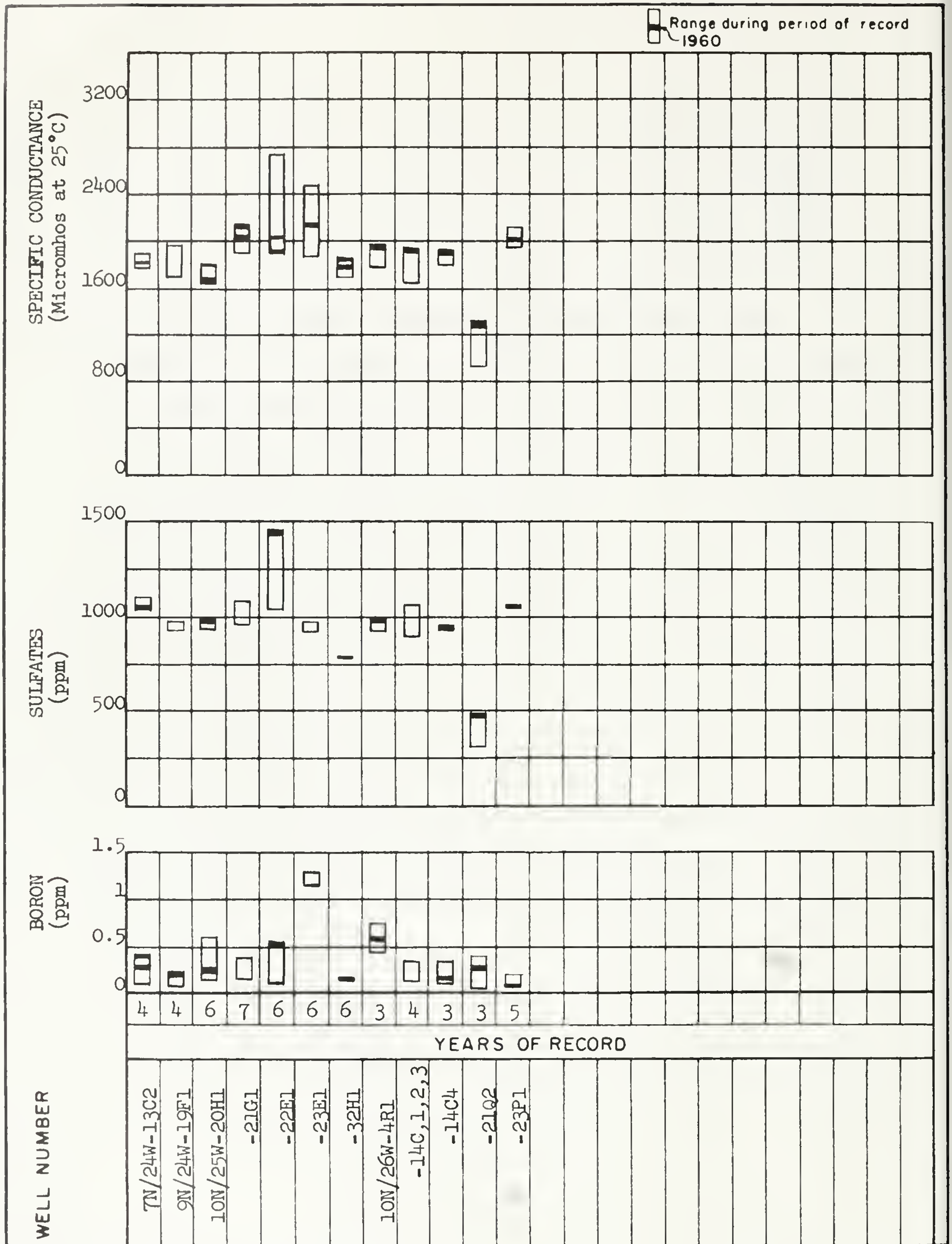
Major Waste Discharges. Oil industry wastes constitute the largest disposal operation in Cuyama Valley. Although the majority of these wastes are discharged to injection wells, ground water could be polluted by spillage, defective casings, or improper sump disposal. Waters from many springs and seeps, although not waste discharges, must be considered as possible degradation to ground water quality, since available data indicate that they are much inferior in quality to ground waters obtained from wells.

Monitoring Program. The ground water monitoring program in Cuyama Valley was established in 1953 to detect possible impairment of ground water quality by oil industry wastes and mineralized springs, principally in the northern and northwestern part of the basin. Through a cooperative arrangement in which the United States Geological Survey assumed the task of ground water sampling in 1957, 22 samples were obtained from 11 monitored wells and a group of 3 springs during 1960.

Evaluation of Water Quality. The character of the ground water is generally calcium sulfate or calcium-magnesium sulfate. The water is of inferior quality for domestic uses because it is excessively high in sulfates and total dissolved solids and is extremely hard. The ground waters are low to moderate in boron content and percent sodium. Although total mineral content is quite high, the water is used successfully for irrigation of a variety of crops. The analyses show the following ranges of important mineral constituents:

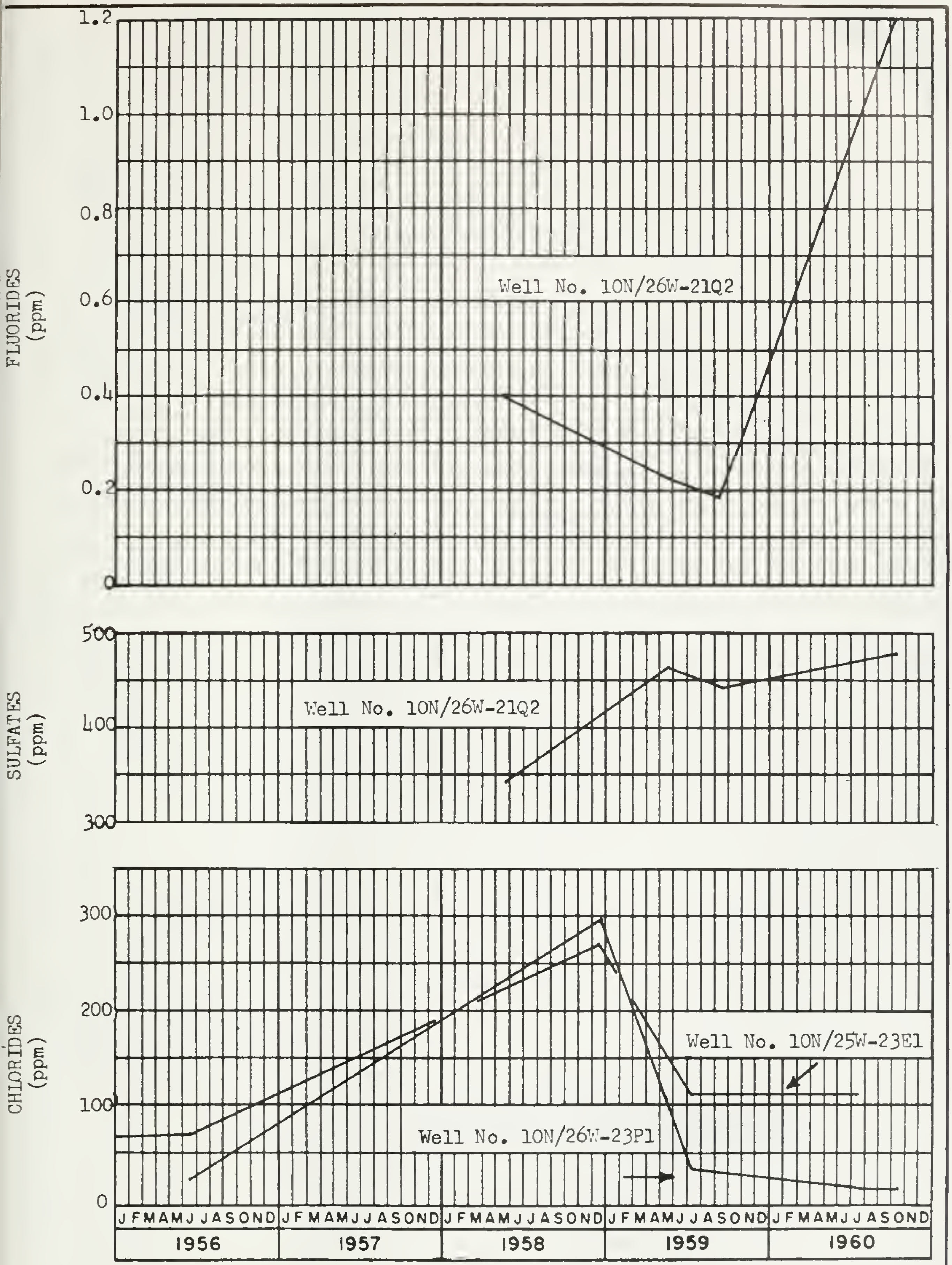
	High	Median	Low	
Total dissolved solids	1,890	1,592	910	ppm
Chlorides	121	18	13	ppm
Sulfates	1,101	985	473	ppm
Total hardness	1,252	991	263	ppm
Boron	0.58	0.30	0.15	ppm
Percent sodium	59	15	14	

Significant Water Quality Changes. A study of analyses of samples collected during 1960 indicates that with exceptions, as noted below, only minor variations in mineral quality have occurred in this period, despite the fact that this basin received only 47 percent of its 50-year mean precipitation and water levels have dropped. Analyses of samples from well 10N/25W-23E1, located approximately 0.8 mile west of the intersection of Highways 166 and 399, show a chloride concentration of 121 ppm. This represents the highest value of chloride content found in Cuyama Valley ground water in 1960. This well also had the highest chloride content for 1959 of 115 ppm. This is a continued increase from the 1955 value of 70 ppm, broken only by a very sharp increase to 278 ppm in 1958. Water from well 10N/26W-23P1, located approximately 3 miles southeast of Cuyama Ranch headquarters, also had a sharp increase in chlorides in 1958 to 294 ppm. For the year 1960, 2 samples showed values of 30 ppm and 32 ppm, a relatively stable return to the 1956 value of 23 ppm. Analyses of water from well 10N/26W-21Q2, located approximately 2.5 miles west of the City of Cuyama, showed an increase in fluoride content from 0.19 ppm in September 1959 to 1.2 ppm in October 1960. This well also exhibits a slight but continuing increase in sulfates.



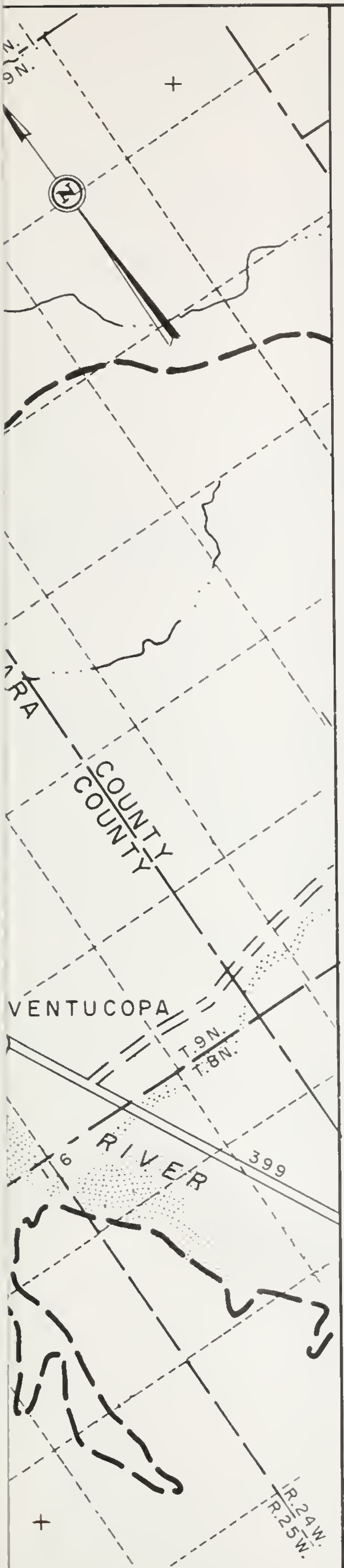
WATER QUALITY RANGES

CUYAMA RIVER VALLEY



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

CUYAMA RIVER VALLEY



LEGEND

BASIN BOUNDARY

11C1 MONITORED WELL

FAULT LINE

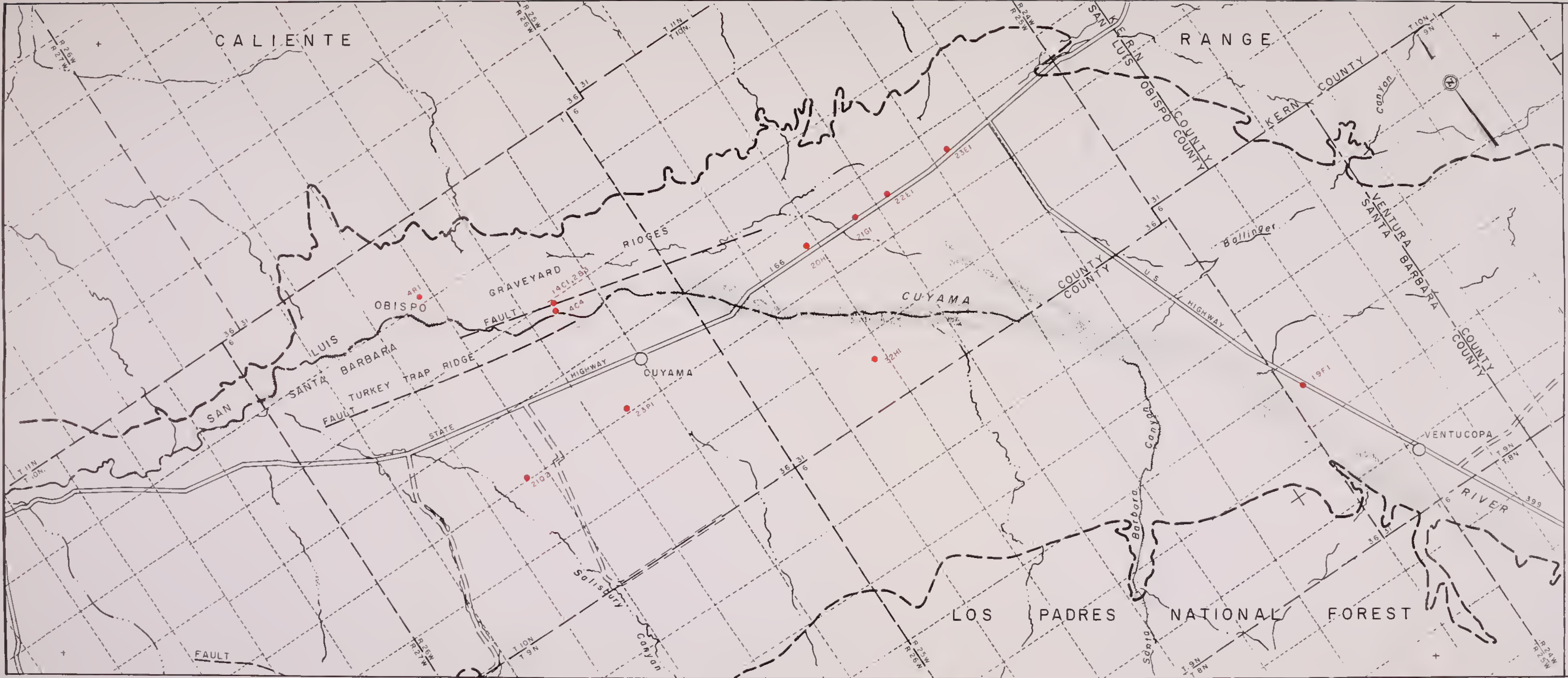
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA

CUYAMA RIVER VALLEY

SCALE OF MILES
1 ½ 0 1

1963



LEGEND

BASIN BOUNDARY

11C1 MONITORED WELL

FAULT LINE

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA

CUYAMA RIVER VALLEY

SCALE OF MILES

1963

Los Angeles Region (No. 4)

The Los Angeles Region extends from the southeastern boundary of the watershed of Rincon Creek in Ventura County to the Los Angeles-Orange County boundary, a distance of about 100 miles. It extends inland from the Pacific Ocean to the crest of the coastal mountains, an average distance of 50 miles, and encompasses an area of about 4,600 square miles in Ventura and Los Angeles Counties, as shown on Plate 1. The region is characterized by broad coastal plains and inland valleys, backed by rugged mountainous topography. Ventura, Santa Clara, Los Angeles, and San Gabriel Rivers are the principal streams in this region.

The ground water supply of the region has been extensively developed, and in many areas has been exploited beyond the point of safe annual yield. Supplemental water is imported from Mono and Owens Valleys to the City of Los Angeles, and from the Colorado River to areas within The Metropolitan Water District of Southern California. Ground water, however, still supplies about 50 percent of the water beneficially used in this large and rapidly growing metropolitan area.

Sixteen ground water basins, and 53 subbasins, have been identified in the Los Angeles Region. The following five basins, subbasins, or areas, have conditions warranting their inclusion in the monitoring program:

Monitored area	Number of wells	Sampling time
Oxnard Plain Pressure Area (4-4.01)	23	Spring and fall
West Coast Basin (4-11.02)		
Santa Monica Bay area	16	Spring and fall
Hawthorne-Gardena area	7	March and October
Torrance area	7	March and October

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Monitored area	Number of wells	Sampling time
Central Basin Pressure Area (4-11.03) and Los Angeles Forebay Area (4-11.04)	4	June and December
Main San Gabriel Basin (4-13.01)	9	April and December

Less than normal precipitation in the 1959-1960 season, approximately 58 percent of the 50-year mean, induced increased extraction of ground water throughout the region. Ground water levels showed a general decline in 1960, and were lower than those of 1959. A general small increase of mineral content of well waters in 1960 was noticed in inland areas, following the improvement of water quality resulting from greater than normal precipitation in the 1957-1958 season.

Along the coastal margins of the Oxnard Plain Basin in Ventura County and the West Coast Basin in Los Angeles County, the ground water pressure surface sloped downward from sea level to elevations of 50 to 100 feet below sea level at points 5 to 10 miles inland. This landward slope made possible the continued intrusion of sea water into fresh ground water aquifers of these basins. In the West Coast Basin, efforts to halt sea-water intrusion and to artificially replenish underground reservoirs with imported water were reinforced by the organization of a water replenishment district covering the Los Angeles County Coastal Plain.

No new pollution sources were found in 1960, and pollution effects were generally less noticeable than in previous years of record, due mainly to local governmental control of industrial waste disposal practices in the past few years.

Oxnard Plain Pressure Area (4-4.01)

The Oxnard Plain Basin underlies a gently sloping plain, roughly triangular in shape, comprising about 73 square miles of the coastal portion of Ventura County. The basin borders the Pacific Ocean for a distance of about 16 miles and is bounded on the north by the Santa Clara River, and on the southeast by foothills of the Santa Monica Mountains; its boundaries are shown on Plate 4, "Oxnard Plain Pressure Area."

Ground Water Occurrence. Continental and marine sediments are the chief sources of ground water in this area, however, a few wells are supplied from fractured Tertiary volcanic rocks. The main water-bearing zones from the shallowest downward are the Oxnard, the Mugu, the Hueneme, and the Fox Canyon aquifers. All of these aquifers are believed to be open to the sea. Along the coastal portion of the basin, the aquifers are confined and form a pressure area. A semiperched ground water body, consisting chiefly of poor quality return irrigation water, exists in the western portion of the basin near Oxnard. The yield of wells in the Oxnard Plain Basin ranges from 900 to 1,100 gpm.

Ground Water Development and Uses. Ground water has been extensively developed to the point of serious overdraft. It is the primary water supply for irrigation, municipal, and industrial uses in the area.

Major Waste Discharges. The major waste discharges in the Oxnard Plain Basin are domestic sewage, industrial waste waters, and minor quantities of oil field wastes. These wastes are discharged to the ocean by pipeline after treatment in sewage treatment plants located in Oxnard and Port Hueneme.

Monitoring Program. The monitoring program in the Oxnard Plain Pressure Area was initiated in 1953 to observe changes in the quality of ground water produced by, and to determine the extent of, sea-water intrusion in the vicinity of Port Hueneme and Point Mugu. In 1960, the program included the analyses of 38 samples of ground water from 23 monitored wells.

Evaluation of Water Quality. Permeable deposits overlying the clay cap which confines the Oxnard aquifer in the pressure area contain poor quality waters consisting chiefly of irrigation return water. The character is similar to that in deeper aquifers, but high concentrations of soluble minerals render it unsuitable for domestic use, and class 2 or 3 for irrigation use. A drainage system has been constructed to discharge this water to the ocean. There is no discernable evidence at present that these perched waters have penetrated the deeper aquifers, but this may possibly occur if ground water levels become sufficiently low.

Available analyses show a similarity in character of waters in the Oxnard, Mugu, Hueneme, and Fox Canyon aquifers. The character is calcium to calcium-sodium sulfate and sulfate-bicarbonate usually, and calcium-magnesium sulfate in limited areas. In areas of sea-water intrusion, the character of the waters is sodium chloride.

Ground waters from the Fox Canyon aquifer are slightly higher in total dissolved solids than Oxnard aquifer waters. However, boron is higher in the Oxnard aquifer waters placing them in class 2 for irrigation use. The ground waters of all these deeper aquifers generally exceed drinking water standards for total dissolved solids and sulfate content. Electrical conductance data place these waters predominantly in class 2 for irrigation use. In 1960, the mineral content of waters in the forebay area and contiguous portions of the pressure area was greater than that of waters in the main part of the basin. This higher mineral content in the forebay areas reflected the surface recharge water quality.

In general, the ground waters in Oxnard Plain area are suitable for irrigation of most crops except those sensitive to boron. The waters are very hard and considered marginal for domestic use because of their high sulfate content.

The analyses of the ground waters of the Oxnard Plain Pressure Area show the following ranges for important mineral constituents:

	High	Median	Low	
Total dissolved solids	23,112	916	638	ppm
Chlorides	10,972	51	37	ppm
Sulfates	1,736	402	73	ppm
Total hardness	7,238	486	254	ppm
Boron	2.00	0.74	0.54	ppm
Percent sodium	60	31	12	

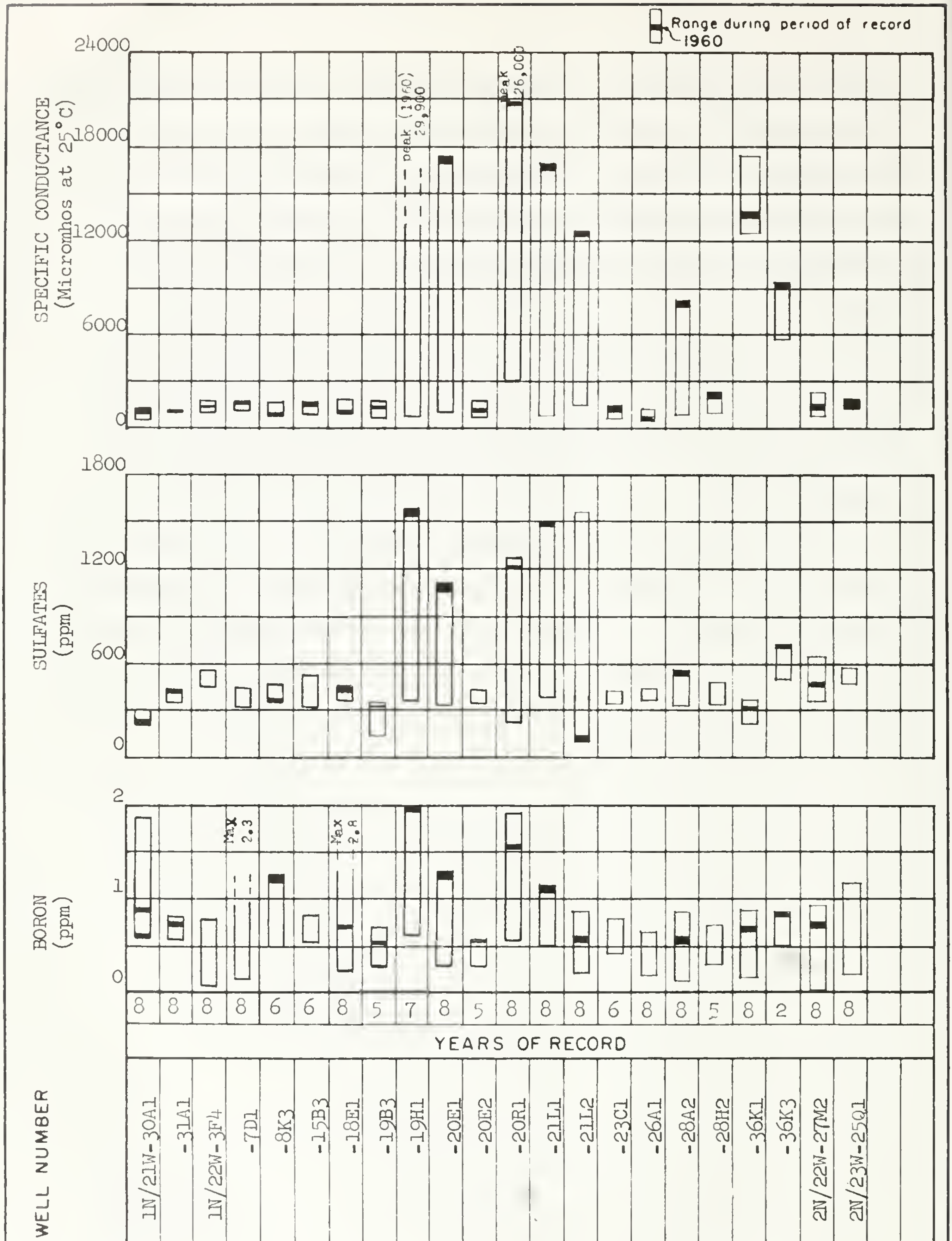
Significant Water Quality Changes. Comparison of analyses of well waters sampled in 1960 with those of seven preceding years indicates that the mineral constituents have increased slightly overall. This is due, in part, to the less than normal precipitation, 64 percent of the 50-year mean, and the lowering of the ground water levels over the Oxnard Plain Basin. The only significant mineral quality variations have occurred in the areas of sea-water intrusion. The status of sea-water intrusion in the Oxnard Plain Pressure Area in 1960 is presented in Plate 4. The lines of equal chloride concentration indicate that sea-water intrusion into the fresh water aquifers of the basin continues in two apparently separated areas, one in the vicinity of Point Hueneme and the other near Mugu Lagoon.

The maximum landward advance of the 500 ppm isochlor in the vicinity of Port Hueneme remains at about 1.9 miles, but the intruded area has expanded laterally. Between Hueneme Road and Pleasant Valley Road, the 500 ppm line of equal chloride concentration advanced southeastward as much as 1,500 feet beyond the corresponding line for 1959. To the west of Ventura Road there is evidence based on analyses of well water in that area indicating significant northwestward movement of the sea-water intrusion front of as much as 1,000 feet during the year. The water from well 1N/22W-19H1, located approximately 0.9 mile northwest of Port Hueneme, has shown an increase in chloride content from 42 ppm in 1952 to 388 ppm in 1958 and to 10,972 ppm in 1960. Well 1N/22W-17J2, located approximately 1.5 miles north of Port Hueneme, has exhibited fairly high chloride concentration in the past compared with its 1952 and 1955 values of 41 ppm. However, in 1960 the chloride content of well 1N/22W-17J2 made a sharp rise from 418 ppm in April to 1,773 ppm in November placing this well definitely in the area of sea-water intrusion. Analyses of water from well 1N/22W-20R1, located one-third of a mile west of the City of Port Hueneme, showed a chloride content of 23 to 43 ppm in the early months of 1951, which increased to 8,900 ppm in November 1956, and decreased to 2,978 ppm in November 1960. Analyses of water from well 1N/22W-28A2 showed continuous chloride increases from 49 ppm in December 1956, to 283 ppm in May 1959 and to 2,710 ppm in May 1960. Similar increases were evident in the majority of wells in the intruded area. Many wells producing native quality waters in the Saviers Road area are showing initial indications of increasing chlorides.

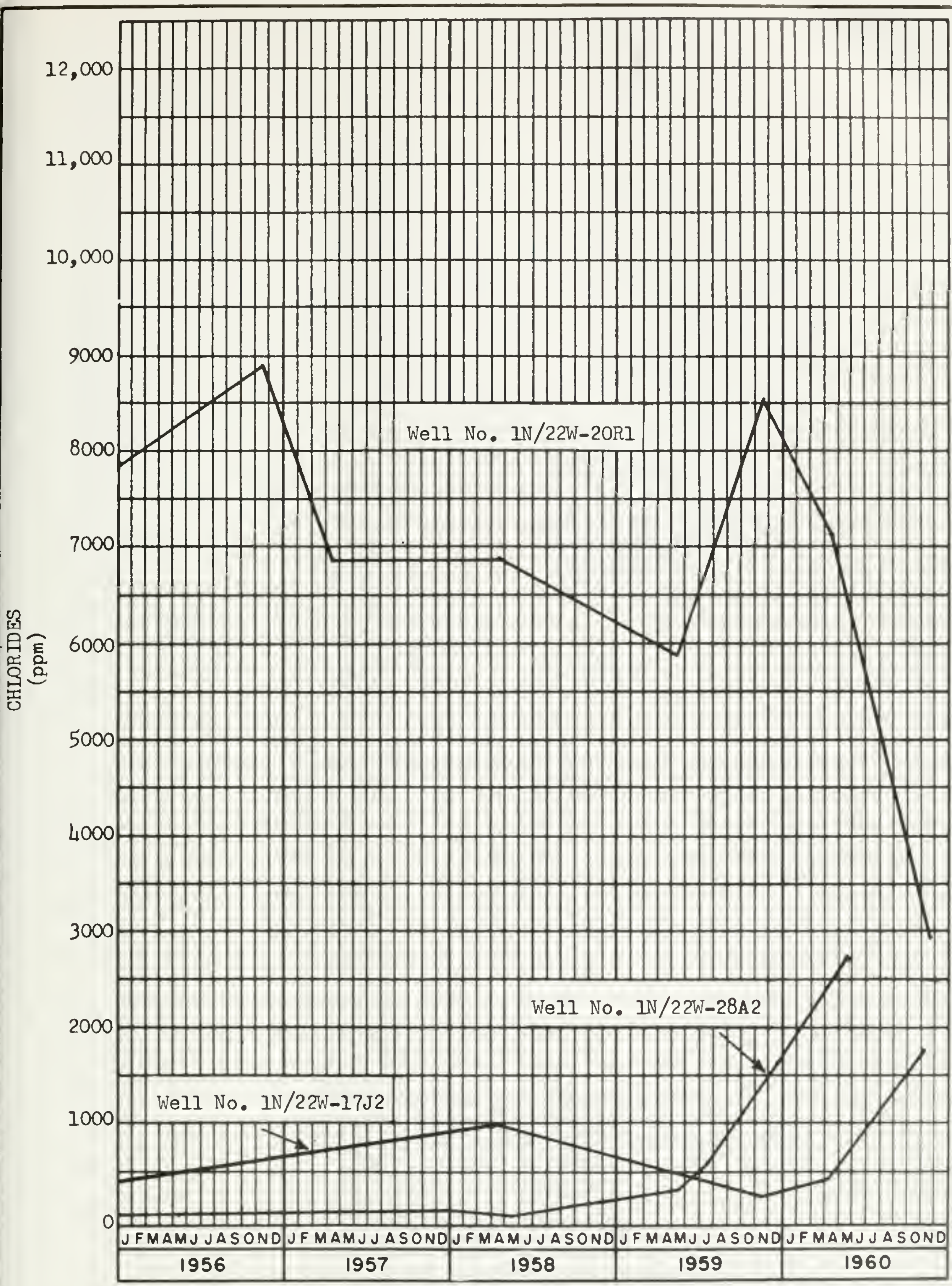
Between Port Hueneme and Point Mugu Lagoon, the chlorides increased noticeably in two areas. Wells in the southern part of Section 36 (1N/22W-36) showed chlorides increasing slowly but continuously. Ground water from well 1N/22W-36K1, located approximately one-half mile southwest of a duck pond, has increased in chloride concentration from 58 ppm in 1952 to 225 ppm in 1959, but then decreased to 148 ppm in 1960. However, the water from well 1N/22W-36K3, located in a duck pond, increased in chloride content from 1,837 ppm in November 1959 to 2,828 ppm in December 1960.

An increase in chlorides in the ground water from several wells has been detected in an area of about one square mile south and west of Hueneme and Arnold Roads. The reason for the increase has not as yet been determined.

In the vicinity of Mugu Lagoon, the definite location of isochlor lines cannot be established due to the absence of wells in key areas, and the lack of samples of ground water from some existing (but nonsampleable) wells. The 500 ppm isochlor line for 1960 on Plate 3 is located at approximately the same position as in 1959.



WATER QUALITY RANGES
OXNARD PLAIN PRESSURE AREA



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

OXNARD PLAIN PRESSURE AREA

LEGEND

BASIN BOUNDARY

MONITORED WELL

29F1

AREA OF CHLORIDE CONCENTRATIONS GREATER THAN 500 PPM SPRING OF 1960

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

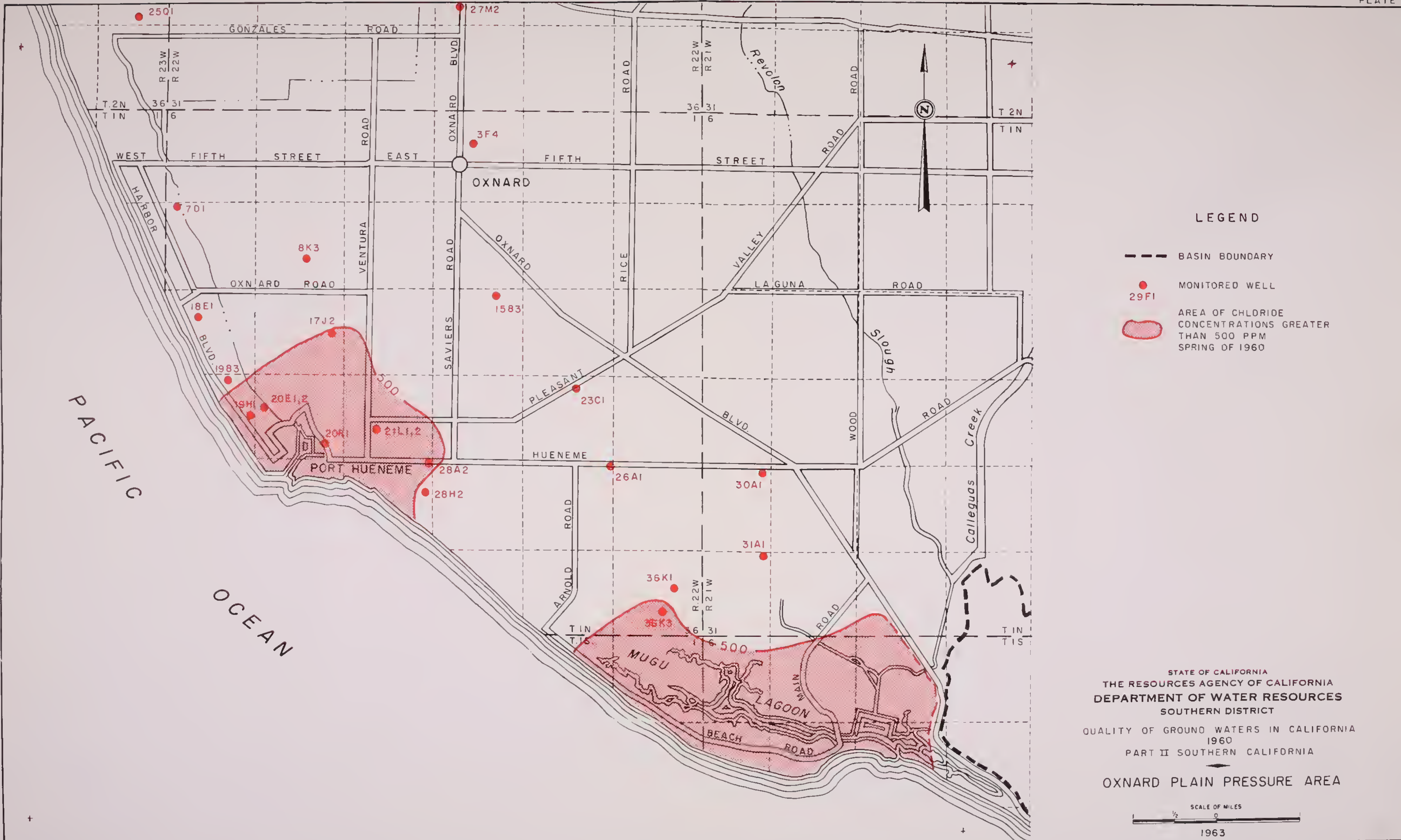
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA

OXNARD PLAIN PRESSURE AREA

SCALE OF MILES

1 ½ 0

1963


LEGEND
BASIN BOUNDARY
MONITORED WELL
29F1
AREA OF CHLORIDE CONCENTRATIONS GREATER THAN 500 PPM SPRING OF 1960
PACIFIC
OCEAN
OXNARD
PORT HUENEME
MUGU
LAGOON
GONZALES ROAD
WEST FIFTH STREET
EAST FIFTH STREET
OXNARD ROAD
LAGUNA ROAD
HUENEME ROAD
PLEASANT VALLEY ROAD
OXNARD BLVD
HARBOR BLVD
VENTURA ROAD
SAVIERS ROAD
OXNARD BLVD
RICE ROAD
WOOD ROAD
ARNOLD ROAD
BEACH ROAD
MAIN
Revolon Slough
Calleguas Creek
T 2N
T 1N
T 1S
R 23W
R 22W
R 21W
500
25Q1
27M2
3F4
7Q1
8K3
15B3
18E1
17J2
19B3
20E1,2
19H1
20R1
21L1,2
28A2
28H2
23C1
26A1
30A1
31A1
36K1
36K3
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA
OXNARD PLAIN PRESSURE AREA
SCALE OF MILES
1963

West Coast Basin (4-11.02)

West Coast Basin is located in the southern part of Los Angeles County along the coast between the Cities of Santa Monica and Long Beach. It is about 19 miles long, has an average width of 9 miles, and includes an area of about 160 square miles. About 80 percent of the surface is a gently rolling, slightly eroded marine plain, while bordering highlands constitute the remainder. The boundaries of the basin are shown on Plate 5, "West Coast Basin."

Ground Water Occurrence. The principal water-bearing deposits are of Pleistocene and Recent age and consist of alternating layers of relatively fine-grained and coarse-grained fluvial sediments. The coarse-grained layers yield ground water readily to wells and are the producing aquifers of the basin. These aquifers can conveniently be divided into an upper and a lower group.

The upper group of aquifers consists of an area of semiperched ground water in the central portion of the basin and the Gaspur, Gardena, and Gage aquifers. The ground water production from this group is of diminishing importance because the water quality is generally marginal or unsuitable for established beneficial uses.

The lower group is composed of the Lynwood and Silverado aquifers. These aquifers contain ground water of good quality and continue to supply a large part of local water needs.

Along the Santa Monica Bay, both groups merge to form essentially one aquifer which outcrops in the floor of the bay. In this area sea-water intrusion of the fresh ground water supply has occurred.

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Depths to the aquifers vary from 50 to 1,200 feet. Yield of wells ranges from 300 to 2,000 gpm, and averages about 500 gpm.

Ground Water Development and Use. Ground water is extensively developed in the West Coast Basin, supplying agricultural, industrial, and domestic requirements. Cultural development has changed over the last 20 years from typically agricultural to metropolitan and industrial. Petroleum production, oil refining, aircraft manufacture, and related industries are concentrated in the basin. Ground water supplies about 40 percent of the water requirements of the basin; the rest is provided by imported water.

Major Waste Discharges. The major waste discharges in the West Coast Basin are oil wastes from the large oil fields and refineries in the area, and industrial and domestic sewage. Although most of the oil wastes are discharged to the ocean by pipeline, the problem of possible degradation of ground water through defective casing, spillage, or use of sumps still exists. Industrial and domestic sewage is treated at sewage treatment plants and discharged to the ocean.

Monitoring Program. The sampling program in the West Coast Basin monitors the ground water quality in the area of sea-water intrusion along Santa Monica Bay and two areas where industrial waste discharges would have an effect on ground water quality, namely, the Hawthorne-Gardena area and the Torrance area. Each of these areas is discussed separately in the presentation that follows.

Santa Monica Bay Area.

The area monitored for sea-water intrusion borders the coastline of Santa Monica Bay. Wells selected for the monitoring program are situated in an area of about 15 square miles, from the northerly limit of the City of El Segundo southward to the vicinity of the City of Redondo Beach. The monitoring program consists of 16 wells from which 32 water samples were obtained in 1960. Obtaining water samples from the same well over a long period of time has presented a problem in this area because soon after a well shows prominent effects of salt-water intrusion, it is generally removed from use by the owner, and routine sampling becomes impractical. When available, other wells are substituted for those removed from the sampling program. Samples of the water from wells without pumps are obtained periodically by Department of Water Resources and Los Angeles County Flood Control District mobile pumping equipment.

Evaluation of Water Quality. The mineral character of the ground water not influenced by sea-water intrusion is sodium bicarbonate to calcium bicarbonate. In the area of sea-water intrusion, the character of water shifts to sodium chloride. The water is hard to very hard and is low in sulfates generally. The lower total dissolved solids values are found outside of the sea-water intruded area. The analyses of the ground water of the Santa Monica Bay area for 1960 show the following ranges for important mineral constituents:

	High	Median	Low	
Total dissolved solids	21,535	630	435	ppm
Chlorides	9,360	188	77	ppm
Sulfates	1,378	38	1.6	ppm
Total hardness	4,030	272	129	ppm
Percent sodium	56	42	33	ppm

Significant Water Quality Changes. The 1960 ground water analyses indicate that very little landward advance of the sea-water intrusion front has occurred since 1959 except in the vicinity of Redondo Beach. In this area exploratory drilling by the Los Angeles County Flood Control District in 1958 revealed a previously unknown, extensive area of high chloride waters. Well 4S/14W-17F2, for example, located 1.1 miles from the ocean, producing water from the Silverado water-bearing zone, showed 2,370 ppm chlorides in February 1959 which increased to 2,880 ppm in November 1960. The Los Angeles County Flood Control District is planning a barrier project in this area.

Such a barrier project already exists in the central section of the intrusion front near Manhattan Beach. In this area, the landward movement of sea water is prevented by a pressure ridge maintained at elevations above sea level by injection of fresh water through wells drilled in a line parallel to the coast. The landward slope of the pressure surface has resulted in an inland flow of the injected fresh water which apparently overrides and drives before it that portion of sea water cut off by the injected fresh water as it spreads. Depression of the saline water and possible dilution effects are indicated by decreases of chloride content of water collected from wells in its path, such as, from well 3S/15W-25A3. Isochlors shown on Plate 4, when compared with the corresponding lines for 1959, show that the injection water mound has enlarged slightly at the northern end of the injection lines.

Northward from the barrier project, through El Segundo and Playa Del Rey, the ground water samples showed that the chloride content has remained fairly constant. The relatively stabilized sea-water intrusion front can be attributed to the fact that ground water levels in the Santa Monica Bay area have dropped less in 1960 than in 1959. Increased surface recharge activities and a higher precipitation, 66 percent of the 50-year mean in 1960 as compared to 49 percent in 1959, may be the cause of this smaller ground water level drop.

Hawthorne-Gardena Area.

This monitored area extends approximately from Florence Avenue, north of the City of Inglewood, to 190th Street on the south, and from Sepulveda Boulevard on the west to Alameda Boulevard on the east. Ground water monitoring in the Hawthorne-Gardena area was initiated in 1953 as a result of a recommendation by a committee of interested local governmental units which conducted a survey of industrial waste disposal in this area under the direction of the Los Angeles Regional Water Pollution Control Board. The monitoring program is designed to detect any degradation of ground water quality which may result from past or present oil well, oil refinery and other industrial wastes discharged to surface channels and sumps. During 1960, 12 water samples were obtained from 7 monitored wells in this area.

Evaluation of Water Quality. The character of the ground water varies from calcium bicarbonate to calcium-sodium bicarbonate chloride. The ground water in the deeper zones is moderately hard to very hard, but is suitable for prevailing beneficial uses. Well 3S/14W-22R2, located about 1-1/2 miles northwest of the City of Gardena, produces from a semi-perched body of water and yields water of marginal quality. The analysis of a water sample collected from this well in 1960 showed a chloride content of 326 ppm, the highest for the area, while well 3S/13W-31F1 decreased from 326 ppm, the high for 1959, to 291 ppm in 1960. The lowest chloride content in samples from monitored wells in 1960 in the Hawthorne-Gardena area was 32 ppm. The median value was 161 ppm. Total hardness ranges from 133 to 624 ppm with a median of 352 ppm.

Significant Water Quality Changes. A study of analyses of ground water samples collected during 1960 indicates that only minor variations in mineral quality have occurred in this period. However, well 3S/14W-22R2 showed a continual increase in mineral constituents from 1956 to 1960. Chloride in water from well 3S/13W-29G3 located about two miles southwest of the City of Compton has continued to increase from 43 ppm in 1953 to 169 ppm in October, 1960.

Torrance Area.

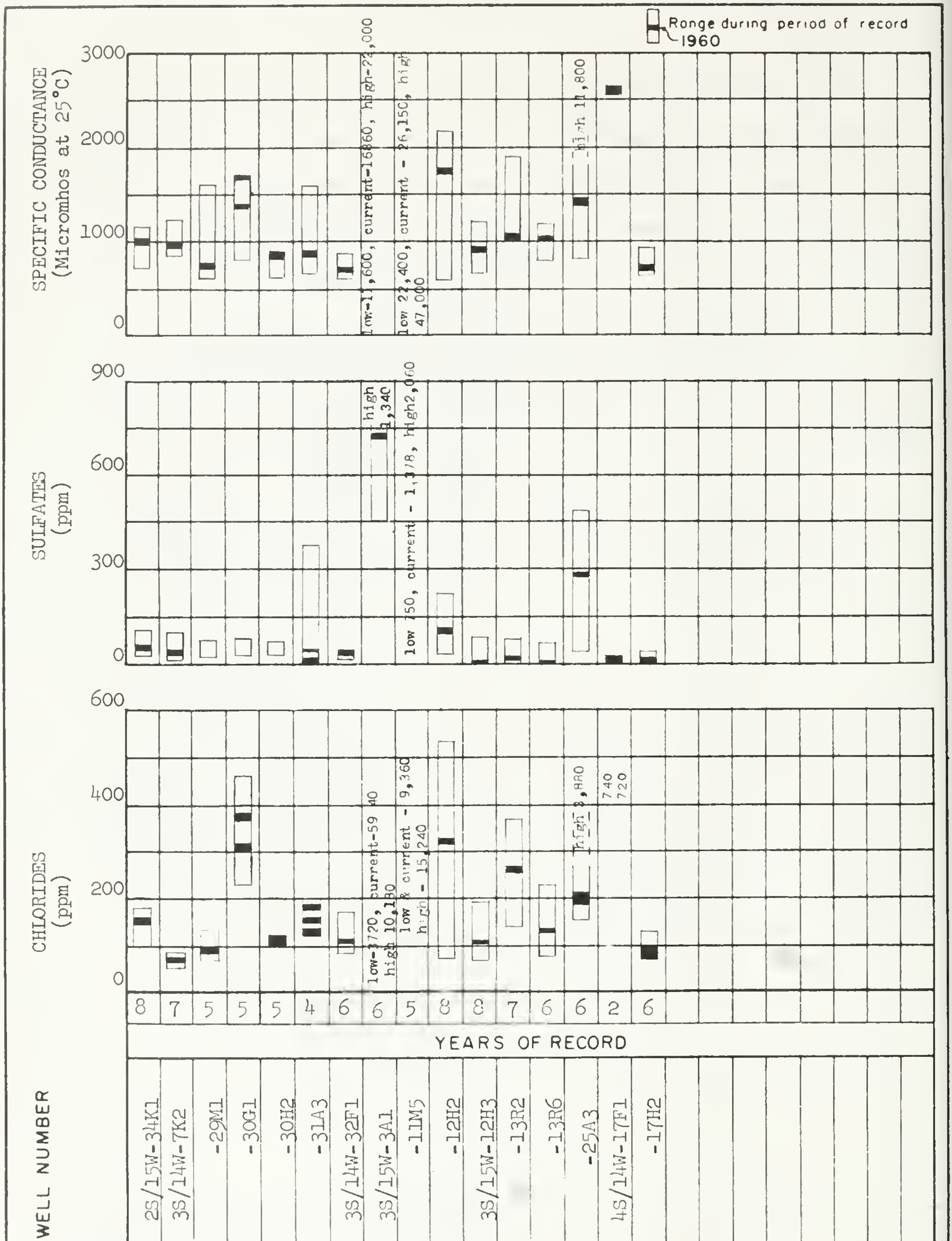
This monitored area in the West Coast Basin occupies approximately 30 square miles of the coastal plain and is bordered by 190th Street on the north, Pacific Coast Highway on the south, Main Street on the east, and Santa Monica Bay on the west. The monitoring program in this area was instituted at the recommendation of the Los Angeles Regional Water Pollution Control Board following a survey of industrial waste discharges in 1953 and 1954. Ground water quality is monitored to follow the effects resulting from the past and present disposal of industrial wastes. During 1960, 14 ground water samples were obtained from 7 monitoring program wells in the Torrance area.

Evaluation of Water Quality. The mineral character of ground water from the Torrance area varies widely. Sodium and calcium are predominant cations, while bicarbonate and sulphate predominate among the anions. Waters in the Gardena aquifer show evidences of local impairment in the eastern part of the monitored area. The ground waters are generally moderately hard to very hard, and range from good to unsuitable for municipal and industrial uses. Ground waters in the deeper aquifers range from good to excellent quality for all beneficial uses.

In 1960, analyses of ground waters of the Torrance area show the following ranges for important mineral constituents:

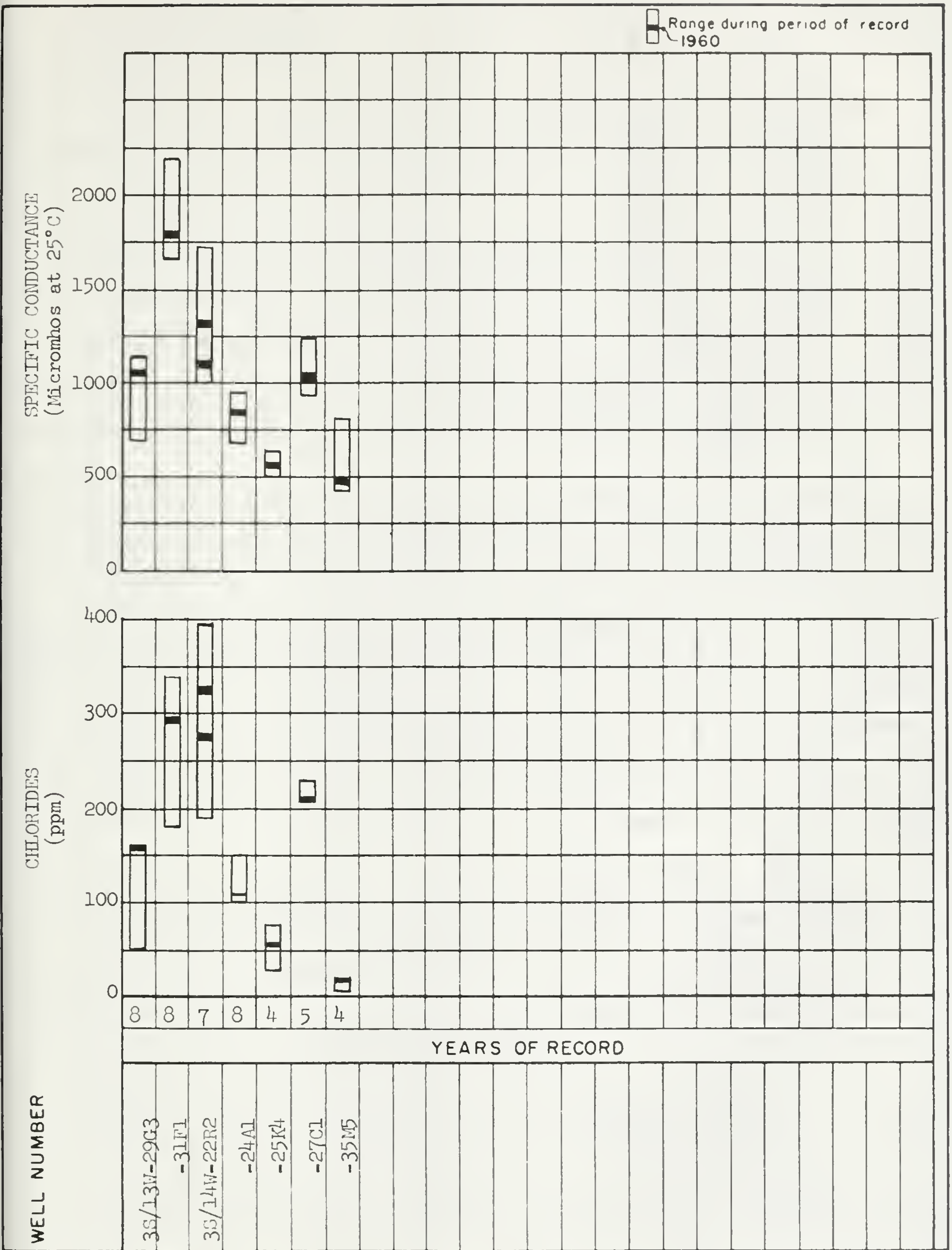
	High	Median	Low
Total dissolved solids	887	610	415 ppm
Chlorides	227	91	64 ppm
Sulfates	248	55	30 ppm
Total hardness	418	158	93 ppm
Percent sodium	71	55	36

Significant Water Quality Changes. Waters from most of the monitoring wells in this area have shown little or no change in character or mineral content. Analyses for the remaining wells showed fluctuations, with little evidence of an area-wide trend. Well 4S/13W-6Q1, located approximately 2-1/2 miles east of the City of Torrance, has steadily decreased in sulfates from 468 ppm in November 1954, to 248 ppm in October 1960, and chlorides from 271 ppm in 1954 to 85 ppm in 1960.



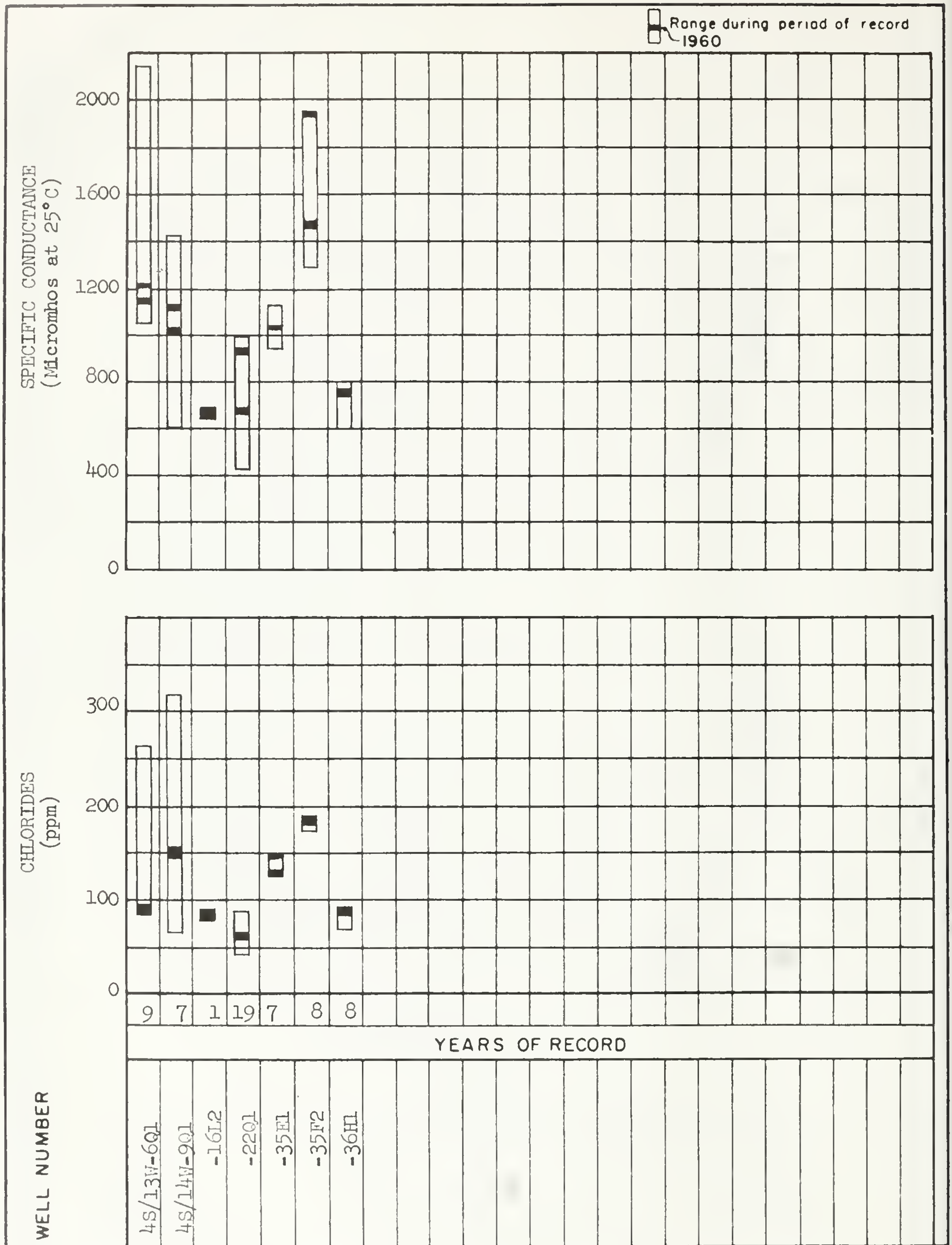
WATER QUALITY RANGES

WEST COAST BASIN
SANTA MONICA BAY AREA



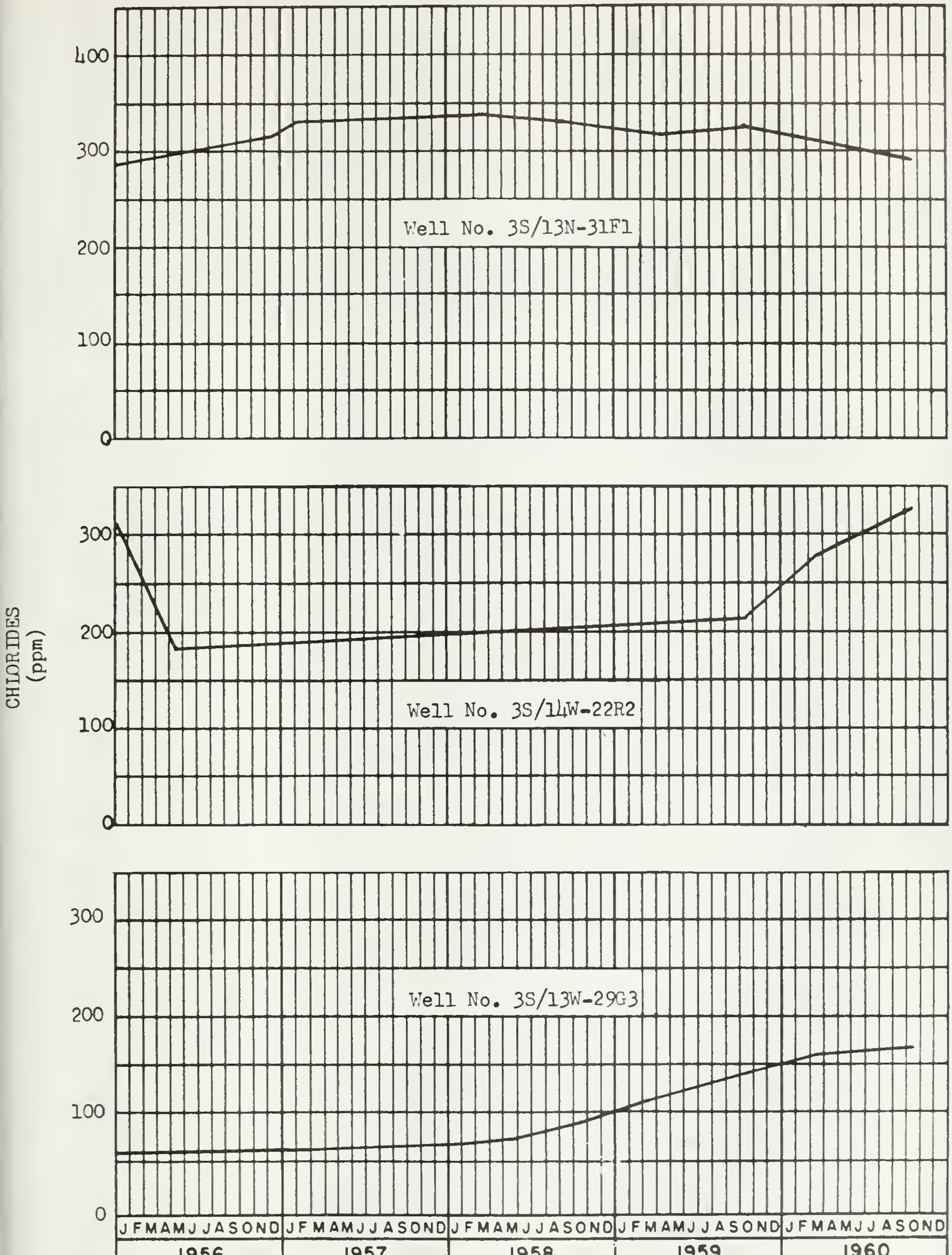
WATER QUALITY RANGES

WEST COAST BASIN; HAWTHORNE- GARDENA AREA



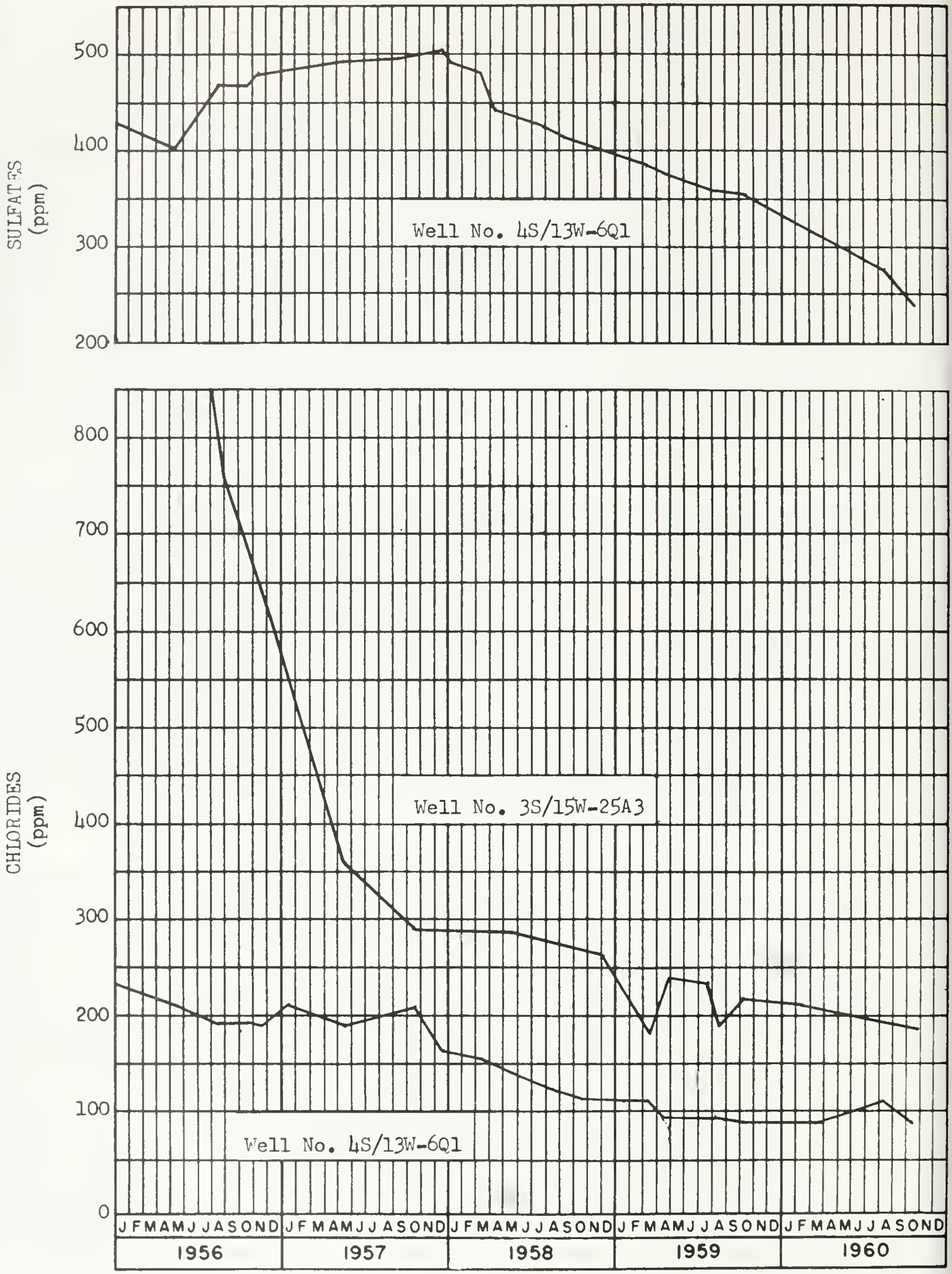
WATER QUALITY RANGES

WEST COAST BASIN - TORRANCE AREA



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

WEST COAST BASIN - SANTA MONICA BAY AREA AND HAWTHORNE - GARDENA AREA



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

WEST COAST BASIN - TORRANCE AREA

LEGEND

BASIN BOUNDARY

APPROXIMATE LIMITS OF MONITORED AREA

7K2 MONITORED WELL

FAULT LINES

AREA OF CHLORIDE CONCENTRATION GREATER THAN 500 PPM SPRING 1960

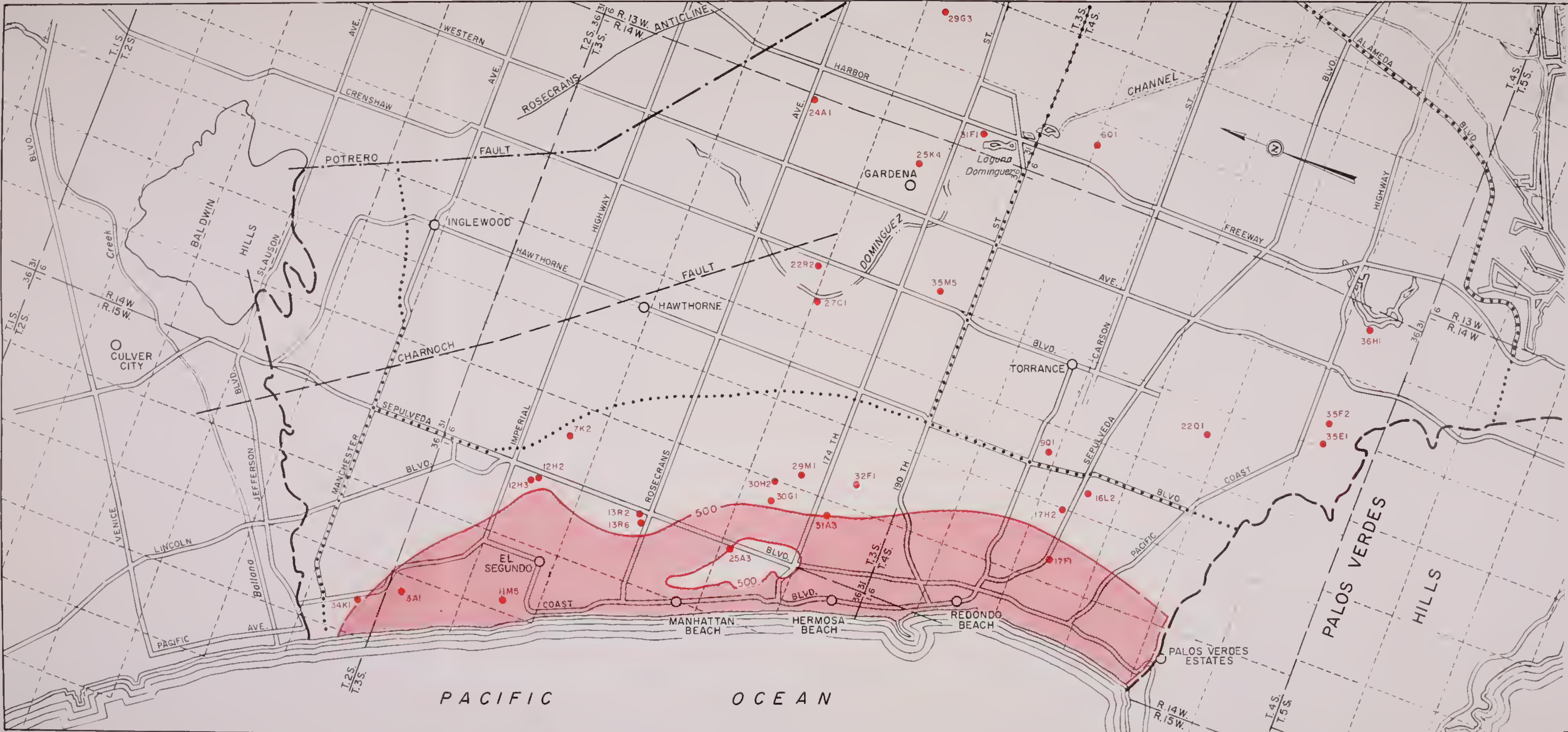
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II — SOUTHERN CALIFORNIA

WEST COAST BASIN

SCALE OF MILES
1 1/2 0 1

1963



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA

WEST COAST BASIN

SCALE OF MILES
1/2 0 1

1963

Central Basin Pressure Area (4-11.03) and Los Angeles Forebay Area (4-11.04)

The Central Basin is located in the south central portion of Los Angeles County. It is bounded by the Hollywood Basin on the north, the West Coast Basin on the west, the Anaheim Basin of Orange County on the south, and a series of low hills on the east. The Central Basin is subdivided into four areas: the Los Angeles Forebay Area, the Montebello Forebay Area, the Whittier Area, and the Central Basin Pressure Area. Of these four areas, the ground water monitoring program is conducted in portions of the Central Basin Pressure Area (4-11.03) and the Los Angeles Forebay Area (4-11.04) only. The monitored area is shown on Plate 6, "Central Basin Pressure Area and Los Angeles Forebay Area."

Except for the portion of the basin abutting the hills on the northeast, the predominant topography of the two areas monitored is that of a gently sloping plain, extending approximately 25 miles from the Los Angeles-Orange County line northwesterly to the vicinity of the Santa Monica Mountains. It has an average width of 12 miles and encompasses an area of about 220 square miles.

Ground Water Occurrence. The principal sources of ground water are the Recent and Pleistocene sediments. Ground water in the Los Angeles Forebay Area is unconfined. Clay strata overlying the aquifers in the Central Basin Pressure Area confine ground waters under hydrostatic pressure. Wells yield up to 5,000 gallons per minute but average about 500 gallons per minute.

Ground Water Development and Use. Ground water is extensively developed to supply municipal and industrial requirements. There is little irrigated agriculture remaining the the Central Basin.

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Ground Water Development and Use. Ground water is extensively developed to supply municipal and industrial requirements. There is little irrigated agriculture remaining the the Central Basin.

Major Waste Discharges. Industrial waste waters and domestic sewage constitute the major waste discharges. These wastes are discharged to the ocean by sewers after treatment at a local sewage treatment plant. Disposal of brine wastes to injection wells from a few small oil fields in the area present a minor threat of ground water pollution.

Monitoring Program. The ground water monitoring program is concerned with an area of about 30 square miles, southwest of the industrial complex centered in the City of Vernon, and overlying portions of both the Los Angeles Forebay Area and Central Basin Pressure Area.

An investigation of industrial waste pollution of ground water in this area was conducted by the Los Angeles Regional Water Pollution Control Board in 1950. Water from 33 wells was found to exhibit hydrocarbon tastes and odors, increased mineralization, or both. Although the findings in the investigation were not conclusive, the data indicated that the source of pollution was industrial wastes discharged to the ground surface which gravitated to the water-bearing zones directly, or possibly through defective or nonused wells. Monitoring was instituted to observe the duration of the pollution in ground waters and to detect and follow quality changes that might occur in deeper aquifers as a result of downward migration of the affected waters.

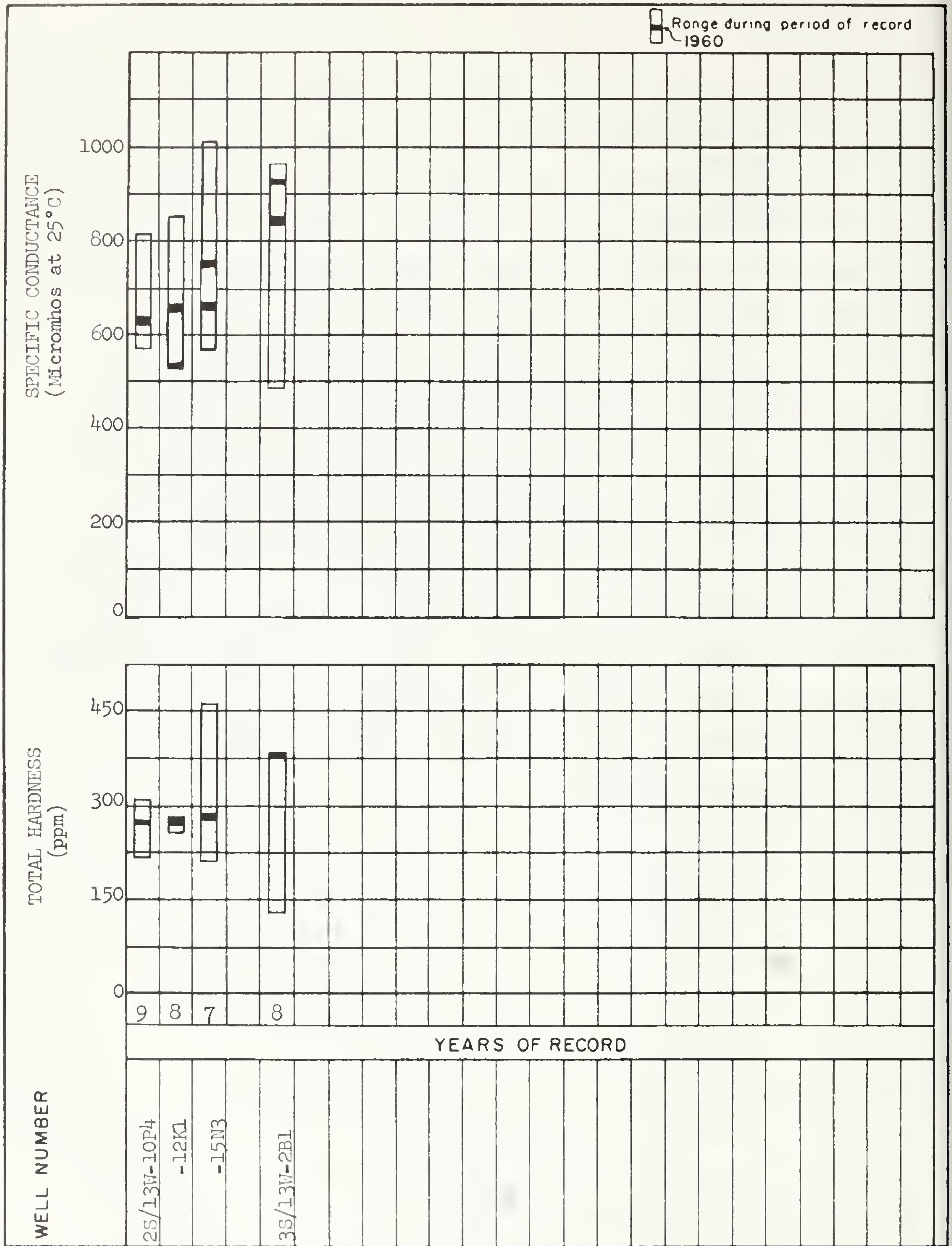
During 1960, eight samples were collected from four monitored wells.

Evaluation of Water Quality. Mineral analyses of ground water samples obtained over the past seven years show that the character of ground water ranged from calcium bicarbonate to calcium bicarbonate-sulfate. Analyses of samples collected from monitoring wells in 1960 showed the following ranges for important mineral constituents:

	High	Median	Low
Total dissolved solids	669	486	371 ppm
Chlorides	70	57	33 ppm
Total hardness	391	268	235 ppm
Sulfates	160	111	62 ppm
Percent sodium	33	29	26

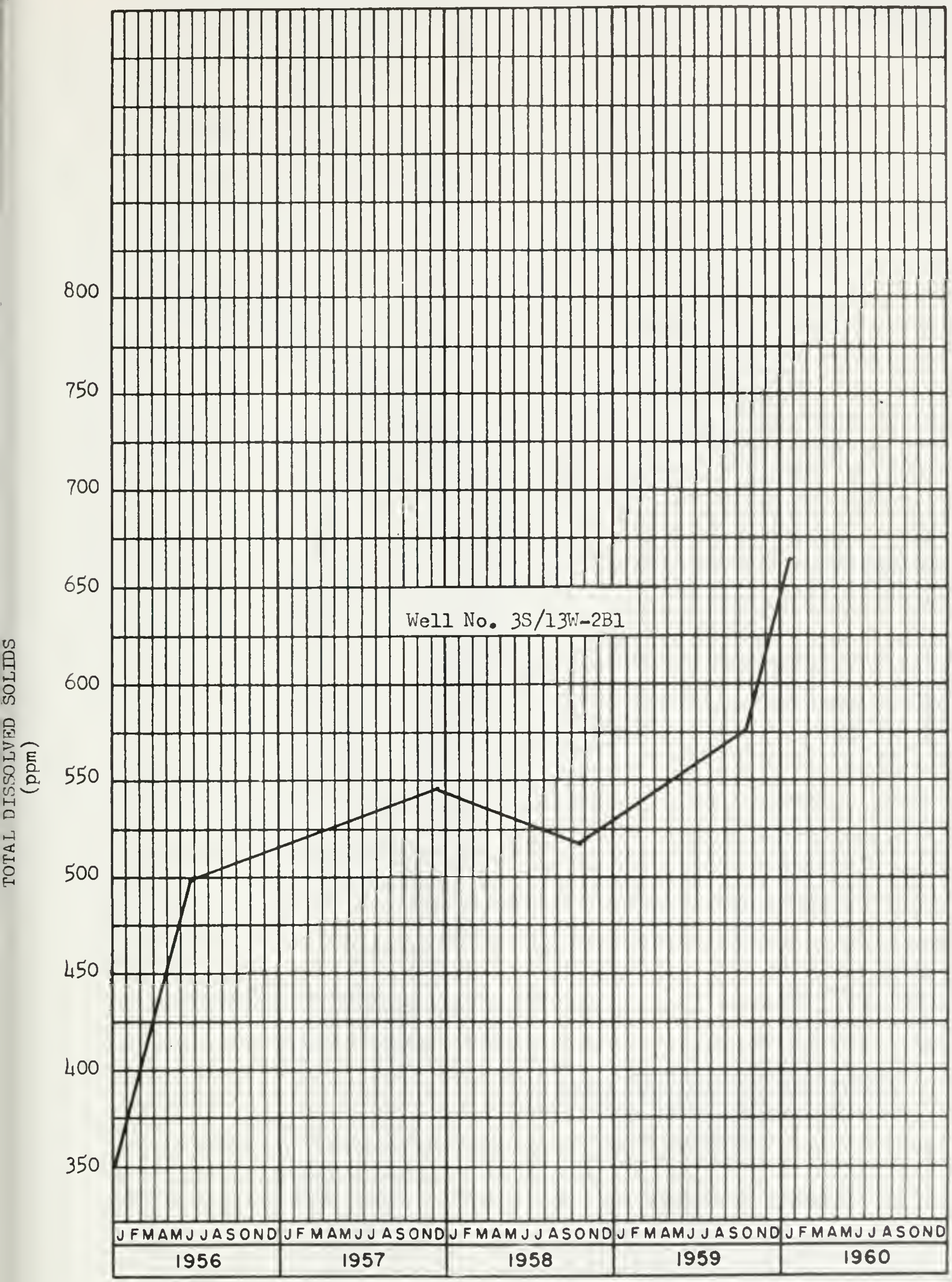
Although hydrocarbon tastes and odors have been noted at times, the water is generally suitable for prevailing beneficial uses.

Significant Water Quality Changes. Comparison of the mineral analyses for 1960 with those of the preceding seven years of record showed a slowly continuing increase in mineral content of ground water, but no marked increase in any individual constituent. This is probably the result of the continuing drop in ground water levels in 1960, due to the less than normal precipitation, 66 percent of the 50-year mean, during the 1959-1960 precipitation season. Well 3S/13W-2B1, a municipal well located in the southwestern part of the City of South Gate, continued to show the greatest increase in total dissolved solids for wells in the monitored area with a value of 669 ppm in January 1960.

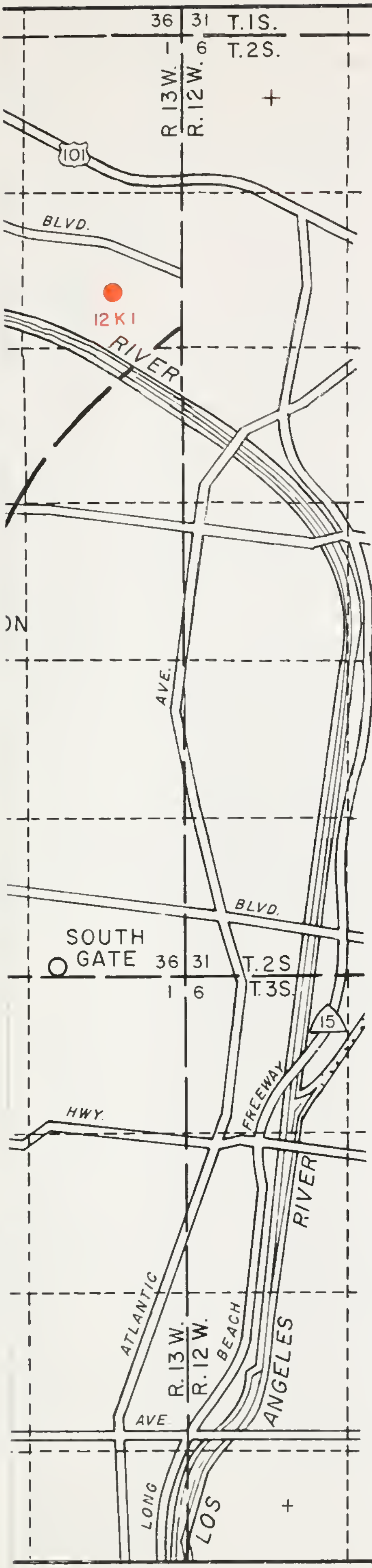


WATER QUALITY RANGES

LOS ANGELES FOREBAY AREA AND CENTRAL BASIN PRESSURE AREA



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS
CENTRAL BASIN PRESSURE AREA AND LOS ANGELES FOREBAY AREA



LEGEND

BASIN BOUNDARY

2B1 MONITORED WELL

FAULT

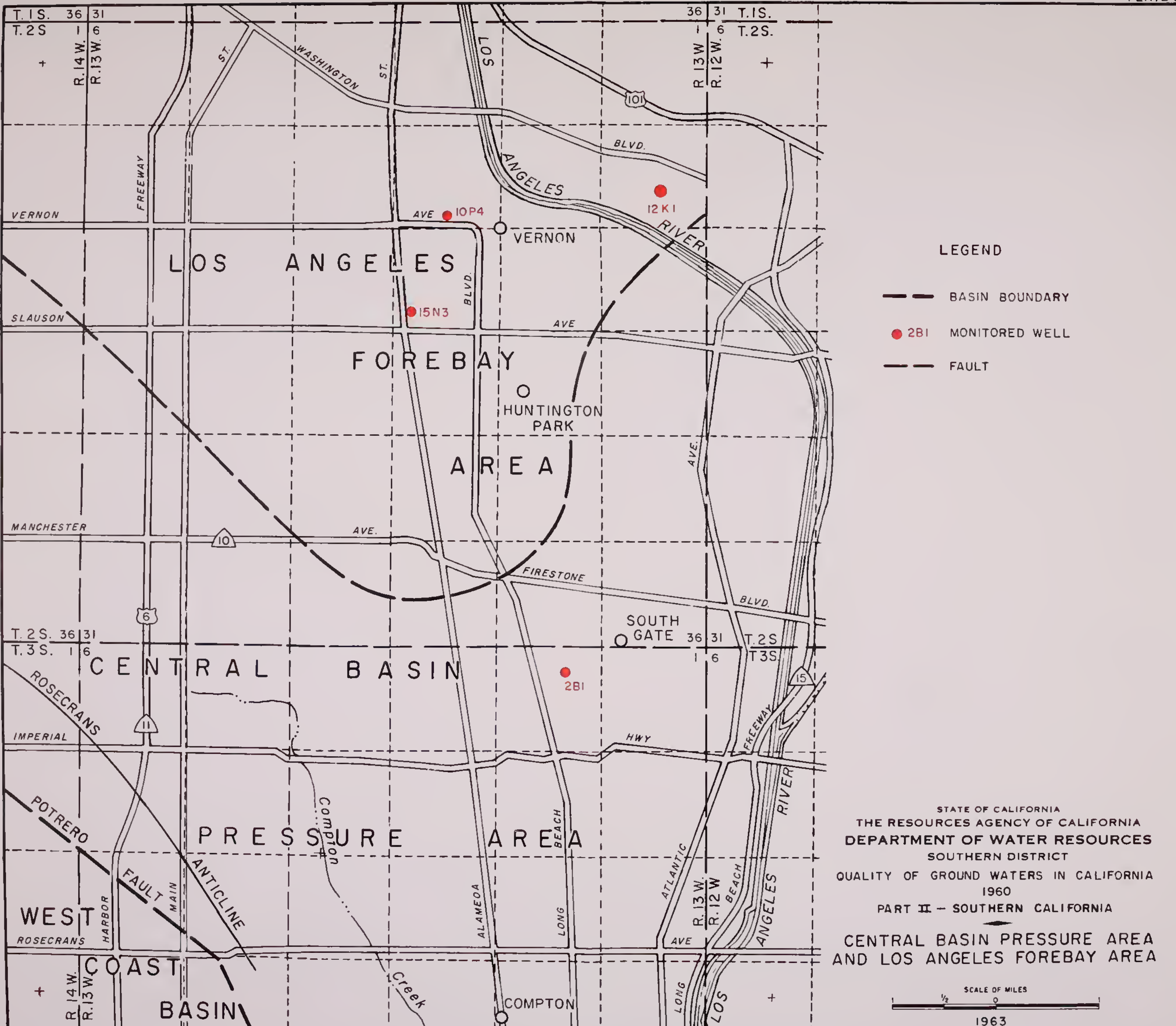
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA 1960
PART II – SOUTHERN CALIFORNIA

CENTRAL BASIN PRESSURE AREA AND LOS ANGELES FOREBAY AREA

SCALE OF MILES
1 ½ 0 1

1963


LOS ANGELES FOREBAY AREA
CENTRAL BASIN PRESSURE AREA
WEST COAST BASIN
LEGEND
BASIN BOUNDARY
2B1 MONITORED WELL
FAULT
10P4
12K1
15N3
2B1
VERNON
HUNTINGTON PARK
SOUTH GATE
COMPTON
WASHINGTON BLVD.
VERNON AVE
SLAUSON AVE
MANCHESTER AVE.
FIRESTONE BLVD.
IMPERIAL HWY
ROSECRANS AVE
LOS ANGELES RIVER
ROSECRANS ANTICLINE
POTRERO FAULT
Compton Creek
HARBOR FREEWAY
MAIN ST.
ALAMEDA ST.
CENTRAL BLVD.
LONG BEACH BLVD.
ATLANTIC AVE.
LONG BEACH FREEWAY
T.1S.
T.2S.
T.3S.
R.14W.
R.13W.
R.12W.
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA
CENTRAL BASIN PRESSURE AREA AND LOS ANGELES FOREBAY AREA
SCALE OF MILES
1963

Main San Gabriel Basin (4-13.01)

The Main San Gabriel Basin is an interior valley in the east central portion of Los Angeles County; its boundaries are shown on Plate 7, "Main San Gabriel Basin." The basin occupies the valley between the San Gabriel Mountains on the north, the San Jose and the Puente Hills on the east and southwest, and the Merced Hills on the south and west. The valley floor slopes gently to the southwest. The basin averages about nine miles in width and encompasses an area of approximately 115 square miles.

Ground Water Occurrence. The principal source of ground water is alluvium deposited from Pleistocene to Recent times. In general, the aquifer is a thick section of unconsolidated sediments and the ground water is unconfined. Wells yield up to 5,500 gallons per minute and average about 1,000 gallons per minute.

Ground Water Development and Use. The ground water in the Main San Gabriel Basin has been extensively developed and supplies all the agricultural, domestic, and industrial requirements. The area has changed during the last 15 years from mainly agricultural to metropolitan and industrial in nature. Water levels have dropped substantially in recent years due to a protracted period of low precipitation and reduced recharge.

Major Waste Discharges. The major waste discharges are industrial and sewage wastes, and domestic rubbish and garbage. Most of the domestic and industrial sewage wastes are collected by the sewerage system of the County Sanitation Districts of Los Angeles County and discharged to the ocean. Disposal of rubbish and garbage in a number of abandoned gravel pits excavated in the highly permeable alluvium of the basin is widely practiced.

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Past disposal practices have posed the threat of ground water pollution if the decomposable refuse should be saturated by high water levels or percolation of applied water as rainfall. Joint efforts by this department and regional water pollution control boards are being made to determine the effects of gaseous and liquid products of decomposition on underlying ground waters.

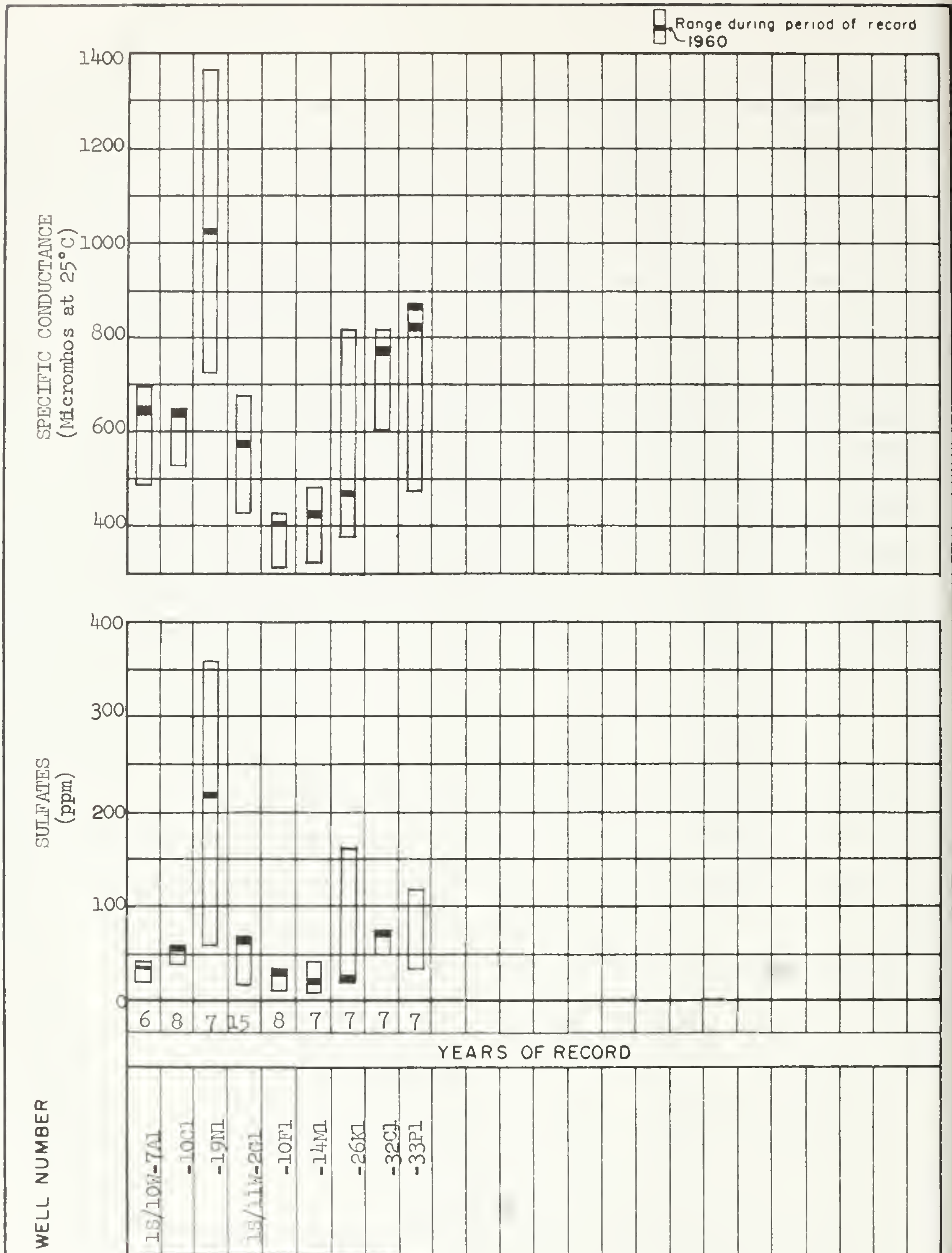
Monitoring Program. The monitoring program was instituted in 1953 to investigate the influence on ground water quality of a rapid change from agricultural use of land to urban and suburban development. A lag in providing waste disposal facilities for the rapidly growing population presented a threat to ground water quality. It now appears that one of the greatest hazards is the potential pollution of ground water by the disposal of decomposable refuse in the alluvium of the basin. In 1960, 16 samples were collected from 9 monitoring wells in the Main San Gabriel Basin.

Evaluation of Water Quality. Mineral analyses of ground water samples show that the character of the ground water is predominantly calcium bicarbonate. Although the waters are hard to very hard, they are generally suitable for prevailing beneficial uses.

In 1960, the ranges for significant mineral constituents were:

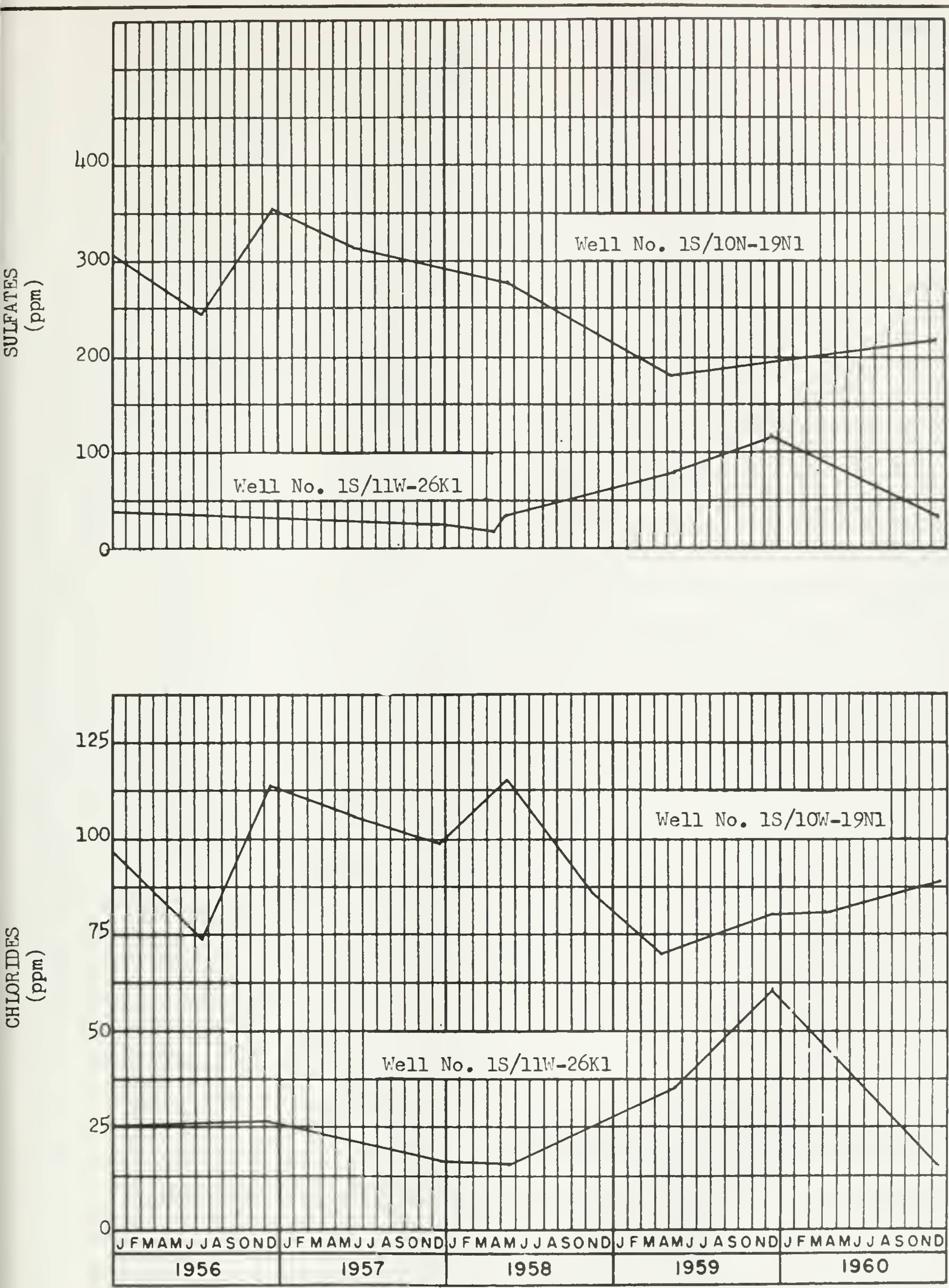
	High	Median	Low
Total dissolved solids	816	403	310 ppm
Chlorides	93	24	9 ppm
Nitrates	49	29	19 ppm
Total hardness	430	291	175 ppm
Sulfates	227	41	16 ppm

Significant Water Quality Changes. Comparison of analyses of ground water samples obtained in 1960 with those of the preceding seven years shows that only minor variations in mineral quality have occurred in the eight years of record. A continuing slight increase in mineral content was noted in ground water throughout the basin, with the exception of samples from well 1S/11W-26K1, located about two miles southeast of El Monte and west of the San Gabriel River. The increase in mineral content and in sulfates for this well in 1959 was attributed to ground water recharge resulting from past releases of Colorado River water to Walnut Creek. In 1960, sulfates and chlorides decreased showing a gradual return toward the native character and quality of the ground water. Well 1S/10W-19N1 again showed a slight increase in mineral constituents after recovering from effects of seepage of Colorado River water which was last conveyed in a canal near the well in 1957.

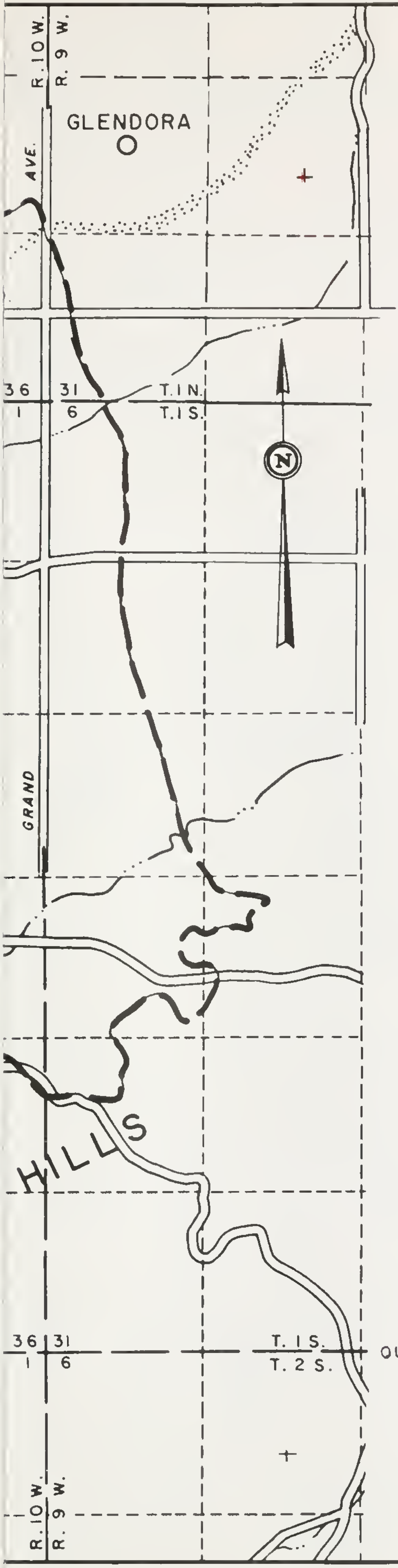


WATER QUALITY RANGES

MAIN SAN GABRIEL BASIN



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS
MAIN SAN GABRIEL BASIN



LEGEND

BASIN BOUNDARY

7A1 MONITORED WELL

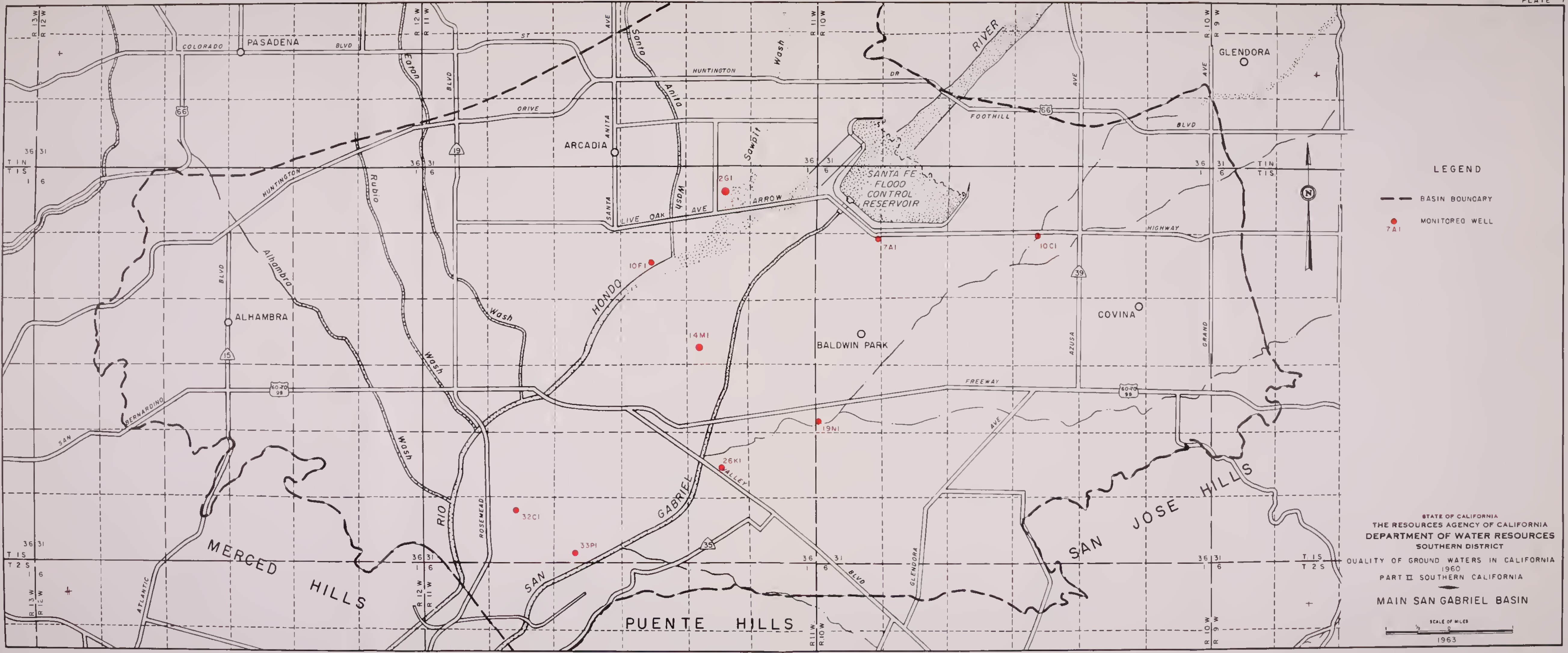
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA

MAIN SAN GABRIEL BASIN

SCALE OF MILES
1 ½ 0

1963



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA

MAIN SAN GABRIEL BASIN

SCALE OF MILES

1963

Lahontan Region (No. 6)

The Lahontan Region is a part of the Great Basin of the western United States. It comprises all drainage basins in California east of the Central Valley and South Coastal areas, except those basins in the southwestern part of the State which drain to the Salton Sea or the Colorado River.

The region has an area of approximately 33,000 square miles and extends about 500 miles along the eastern boundary of the State from the Oregon state line on the north to the San Bernardino and San Gabriel Mountains on the south. It is bounded on the west by the Sierra Nevada Range and the Tehachapi Mountains, and on the east by the California-Nevada state line. The region encompasses all of Mono and Inyo Counties and parts of Kern, Los Angeles and San Bernardino Counties, as shown on Plate 1.

Eight ground water basins in the Lahontan Region have been included in the statewide ground water monitoring program. The names of the monitored areas, the number of monitored wells in each basin sampled in 1960, and the time of sampling are listed in the following tabulation.

Monitored Area	Number of Wells Sampled	Sampling Time
Surprise Valley (6-1)*	21	July
Madeline Plains (6-2)*	13	August
Honey Lake Valley (6-4)*	27	August
Tahoe Valley (6-5)*	5	September
Carson Valley (6-6)*	6	September
Topaz Valley (6-7)*	7	September
Bridgeport Valley (6-8)*	5	September
Lower Mojave River Valley (6-40) Barstow to Yermo	10	March, August, and December

Precipitation varies from sparse to abundant in various parts of the region due to extreme differences in latitude and elevation. Usually

*These groundwater basins are located in Northern California and will be discussed in Part I of this bulletin.

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Precipitation varies from sparse to abundant in various parts of the region due to extreme differences in latitude and elevation. Usually

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precipitation occurs in the winter season, but summer storms of cloudburst proportions occasionally arise. In 1960, 61 percent of the 50-year mean precipitation fell over the entire region.

All basins in this region drain interiorly. Several very large dry lakes are found in basin depressions in the southern desert portion. Twelve hydrographic provinces comprise the main watershed areas, and 60 ground water basins have been identified in the region.

Ground water provides most of the water used in the southern portion of the Lahontan Region, and where it is extensively developed, the ground water levels are falling. Use of water is shifting slightly in emphasis from irrigation to municipal and industrial uses. Boron mining operations, which supply 80 percent of the world's needs, are large users of ground water in Region 6. In Antelope Valley, military bases and aircraft and missile production form a substantial part of the economy. However, considerable areas of irrigated agriculture are still found there as well as in Fremont Valley and along the Mojave River.

Because of taste, odor, and foaming problems, the ground water monitoring program for the Lahontan Region is concentrated in the Lower Mojave River Valley between Barstow and Yermo. In this area, 10 wells are sampled three times a year, in March, August, and December.

Lower Mojave River Valley (6-40), Barstow to Yermo

Lower Mojave River Valley extends from the river narrows near Barstow 25 miles eastward along the river channel as shown on Plate 8, "Lower Mojave River Valley-Barstow to Yermo." The basin is bounded on the north by hills that rise abruptly along the southern extent of the Waterman Thrust fault. The southern boundary is a ridge with a maximum elevation of 3,130 feet composed of a thick deposit of Pleistocene alluvium. The eastern limit of the basin is formed by a complex of interbedded volcanic and sedimentary rocks that rise abruptly from the river's flood plain along an erosional escarpment. The basin varies in width from two to seven miles, and encompasses about 160 square miles.

Ground Water Occurrence. The upper portion of the Lower Mojave River ground water basin is a narrow and shallow deposit of river alluvium adjacent to and overlying nonwater-bearing rocks. The base of the Recent alluvium is about 200 feet below the ground surface. A few wells are deeper and produce some water from the underlying and adjacent older alluvium. The aquifers are unconfined. Ground water near the river is generally found within 20 feet from the surface, and seasonal variations are usually less than 20 feet.

Ground Water Development and Use. Ground water currently supplies all prevailing beneficial uses. Ground water is used for domestic and municipal, industrial, and irrigation purposes. Military bases and railroad repair shops are large industrial users.

Major Waste Discharges. Major waste discharges are domestic sewage from the City of Barstow and the military establishments, and industrial wastes in the vicinity of Barstow and Daggett. The sewage effluent from the Barstow sewage treatment plant is used for irrigation, and overflow is discharged to the Mojave River channel. Industrial waste from railroad shops and yards is treated in settling and skimming ponds, and the effluent is discharged to the river channel.

Significant quantities of synthetic detergents, petroleum products, phenols, hexavalent chromium, and relatively high fluoride and boron concentrations have been identified in these waste waters at various times.

Monitoring Program. Complaints of tastes and odors in well waters in the vicinity of Barstow prompted an investigation conducted by the State Division of Water Resources in 1951 and 1952, at the request of the Lahontan Regional Water Pollution Control Board. Although no evidence of pollution was found in the investigation, the monitoring program was established in 1954 to detect possible pollution of ground water supplies by sewage and industrial waste discharges into the Mojave River channel, or degradation by inflow of poor quality ground water from the older alluvium of the foothills on the south.

In 1958 and 1959, sampling was intensified to obtain additional data for a joint report of the board and the Department of Water Resources. The State Department of Public Health conducted studies of taste and odor problems in the investigation, and the Bureau of Sanitary Engineering made sanitary surveys in the area. The findings from this investigation caused an expanded monitoring program which resulted in the collection of 25 samples from 10 wells in 1960.

Areas where taste, odor, and foaming problems occurred extended for about 2-1/2 miles down the river from points of major waste discharges. The areas affected by these quality problems are shown on Plate 8.

Evaluation of Water Quality. The ground waters in the Recent alluvium of the river channel are sodium-calcium bicarbonate in character and are generally of good quality for prevailing beneficial uses, but fluoride is sometimes high in an area south of the river and east of Barstow.

Water in the older alluvium is predominantly sodium sulfate in type. The water often exceeds recommended limits for drinking water in total dissolved solids, and fluoride. It varies from hard to very hard water. It is usually class 2 and sometimes class 3 irrigation water, and is very often high in boron content.

Analyses of ground water samples obtained in 1960 showed the following ranges for significant mineral constituents:

	High	Median	Low	
Total dissolved solids	735	410	190	ppm
Chlorides	132	51	13	ppm
Sulfates	151	82	24	ppm
Boron	1.2	0.17	0.05	ppm
Fluorides	0.93	0.6	0.3	ppm
Total hardness	396	199	88	ppm
Percent sodium	55		40	

Significant Water Quality Changes. Comparison of analyses of the ground water samples obtained in 1960 with those of the previous six years shows that, in general, only minor irregular changes in mineral quality have occurred. These changes appear to be influenced by magnitude of flow in the Mojave River.

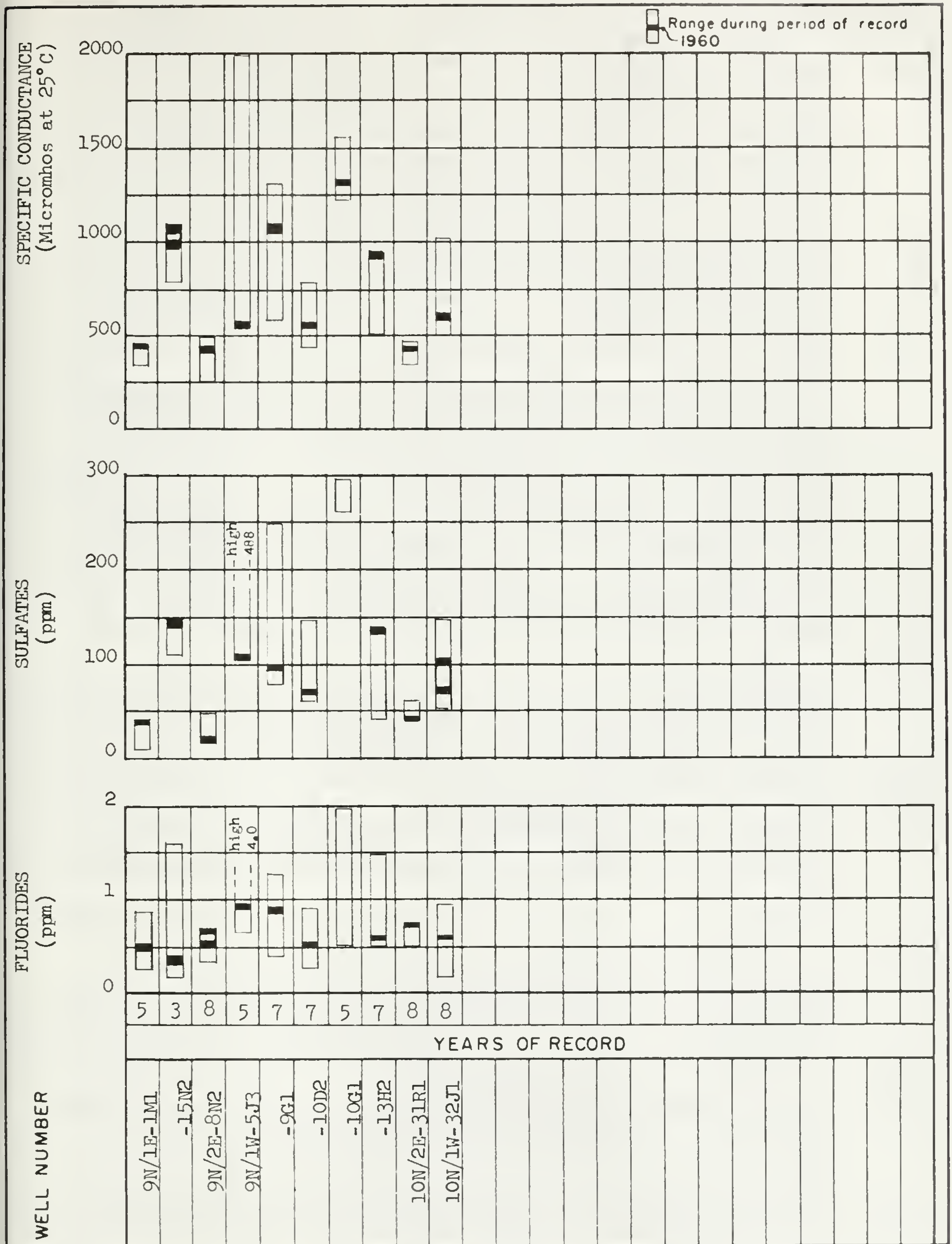
In 1960, the lower Mojave River Valley received lower than normal rainfall, and ground water levels dropped. The two preceding years were of higher than normal rainfall for this area. This may account for the general decline in mineral constituents since 1958 being brought to a halt and leveling off between 1959 and 1960. Exceptions are noted below.

Well 9N/1W-5J3, located east of Barstow and south of the river channel, shown in earlier reports of this series, has been discontinued from use by the Southern California Water Company. A discharge line which served as a point of collection for water from this well now contains water from the adjacent basin to the west of Barstow. This is illustrated by the sudden change in mineral constituent concentrations in the ground water sample analyses since 1959.

Well 9N/1W-9G1, located approximately 2-1/2 miles southeast of Barstow, is high in boron, total hardness, fluorides, and total dissolved solids for the monitored area. Sulfate concentration has decreased rather steadily since 1956, but chloride, fluoride and boron concentrations have remained fairly constant. Total hardness increased sharply to its present high value of 396 ppm.

Wells 9N/1W-9G1 and 9N/1W-10D2, located about three miles southeast of Barstow, both exhibited foam in March 1960, attributable to waste discharges.

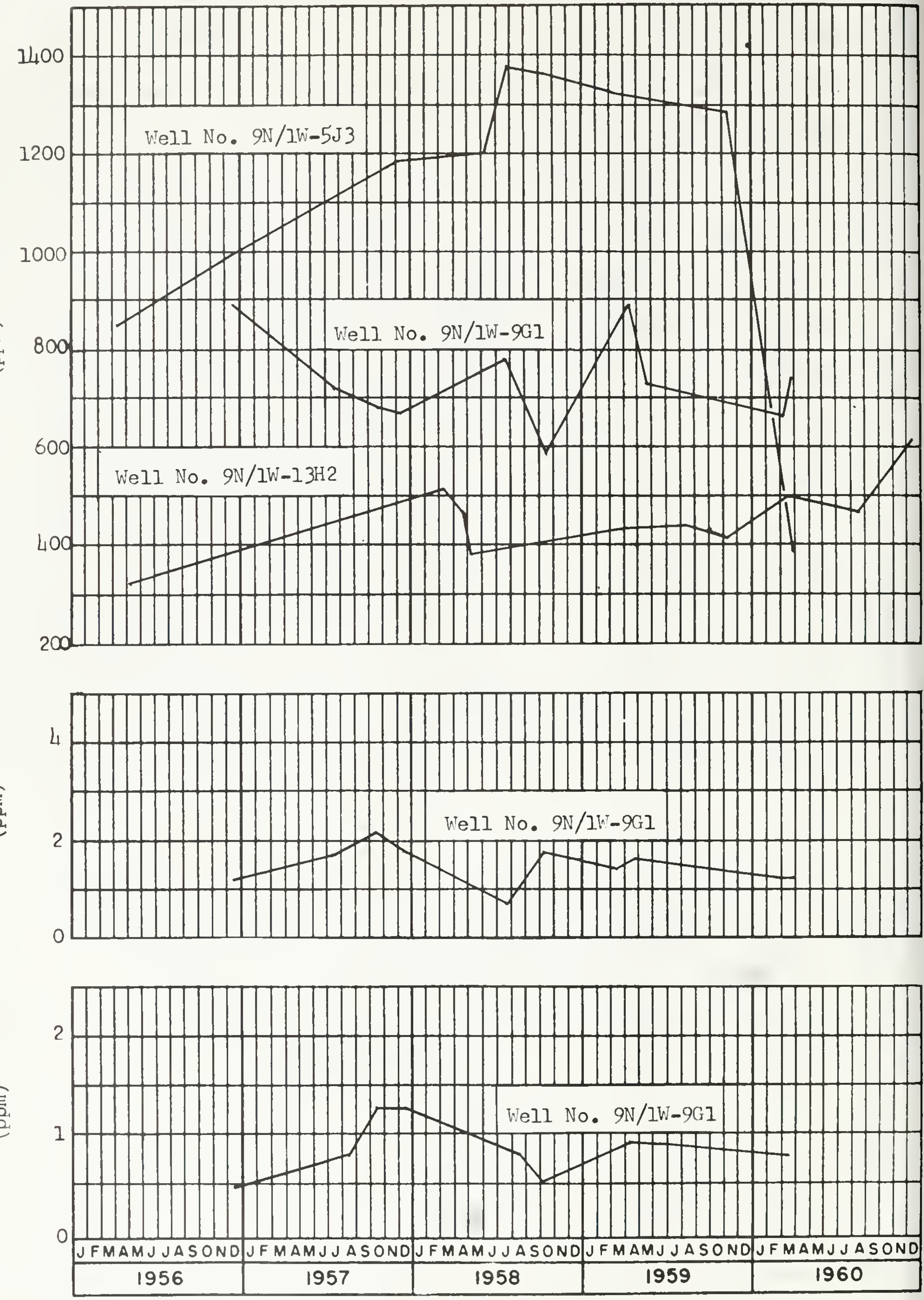
Well 9N/1W-13H2, located approximately six miles southeast of Barstow, has shown a fairly steady increase in total dissolved solids from 323 ppm in 1956 to 410 ppm in 1959 to 618 ppm in 1960.



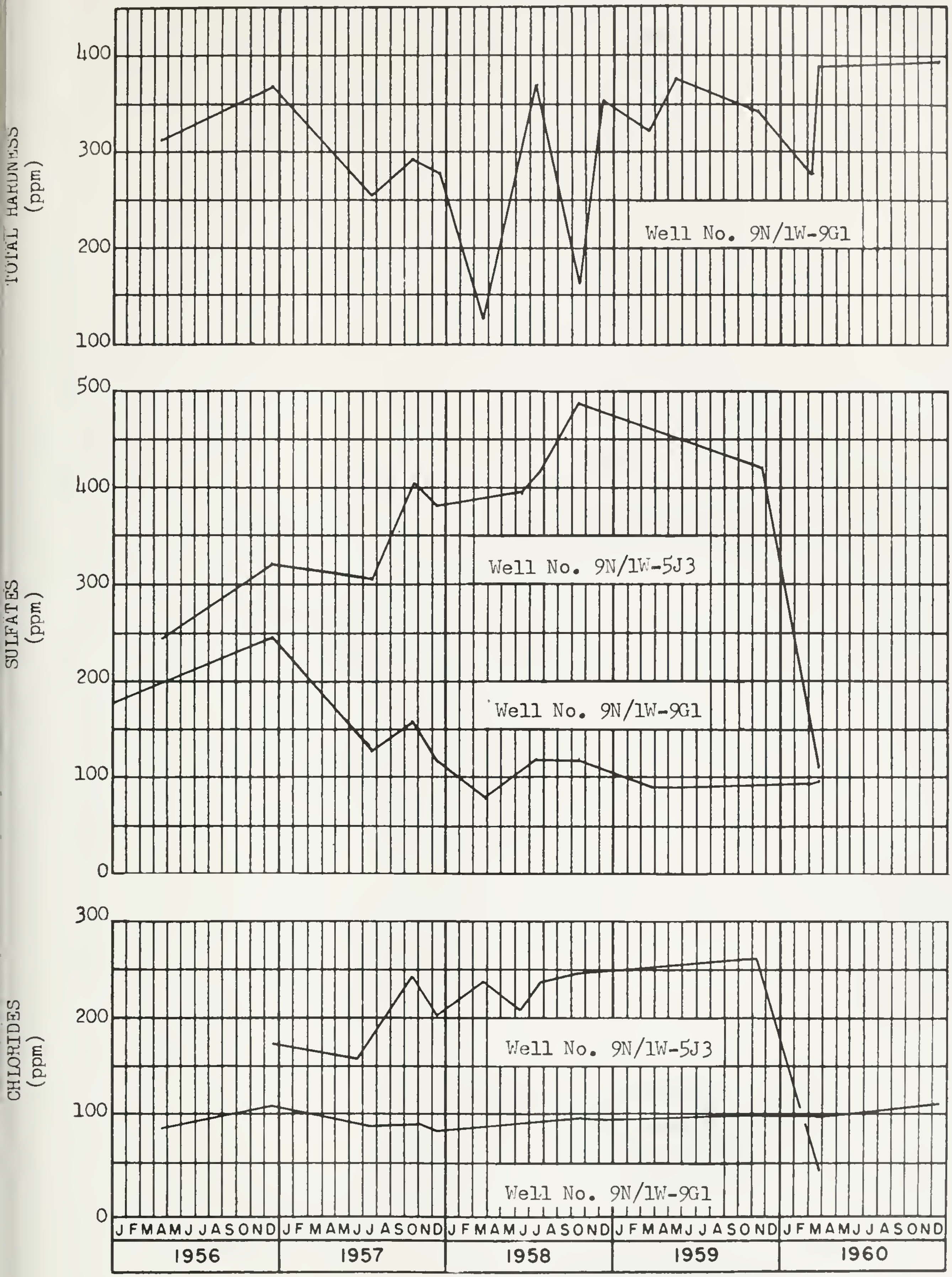
WATER QUALITY RANGES

LOWER MOJAVE RIVER VALLEY

BARSTOW TO YERMO

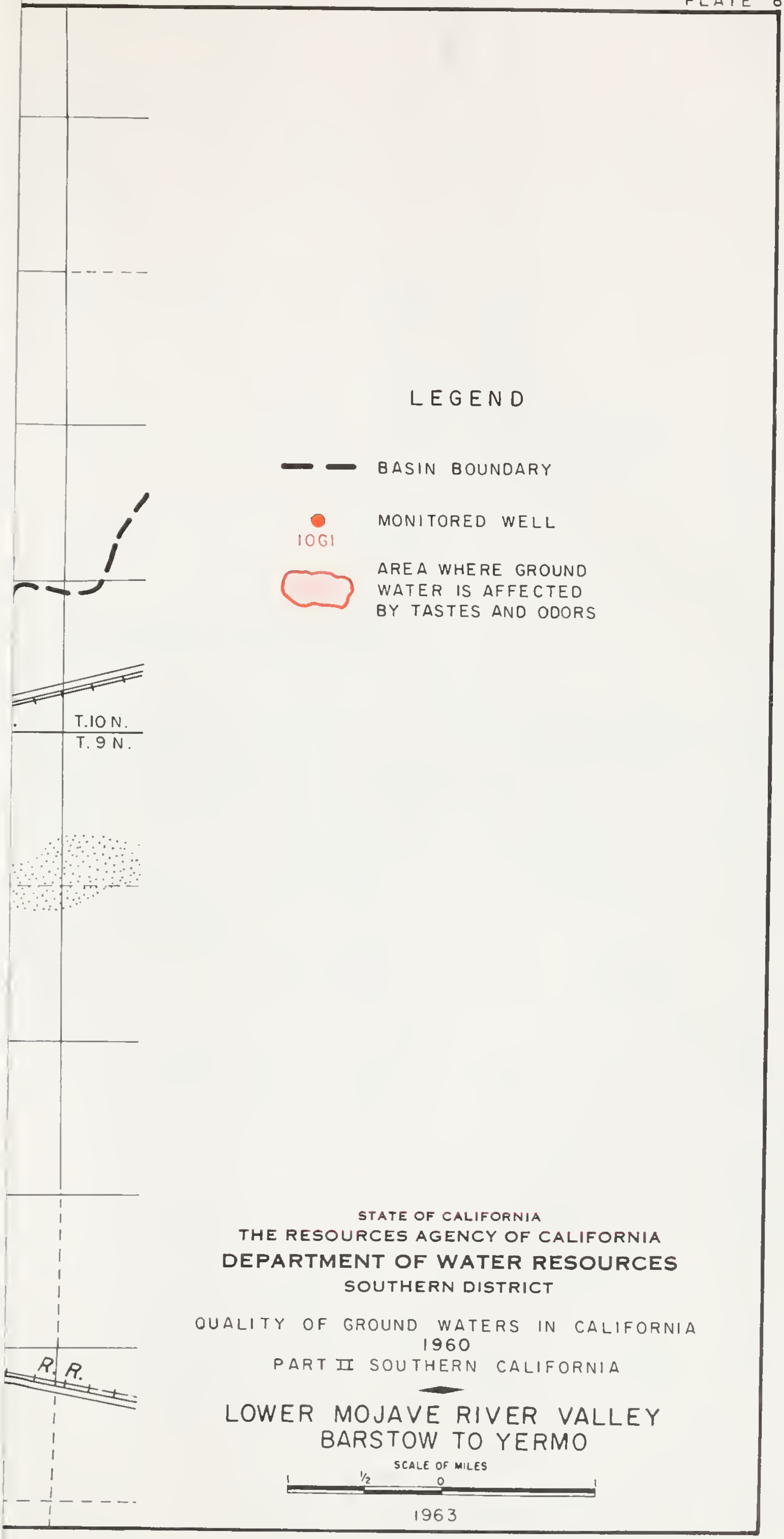


FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS
LOWER MOJAVE RIVER VALLEY - BARSTOW TO YERMO



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

LOWER MOJAVE RIVER VALLEY - BARSTOW TO YERMO


LEGEND
BASIN BOUNDARY
MONITORED WELL
10G1
AREA WHERE GROUND WATER IS AFFECTED BY TASTES AND ODORS
T.10 N.
T. 9 N.
R. R.
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA
LOWER MOJAVE RIVER VALLEY
BARSTOW TO YERMO
SCALE OF MILES
½
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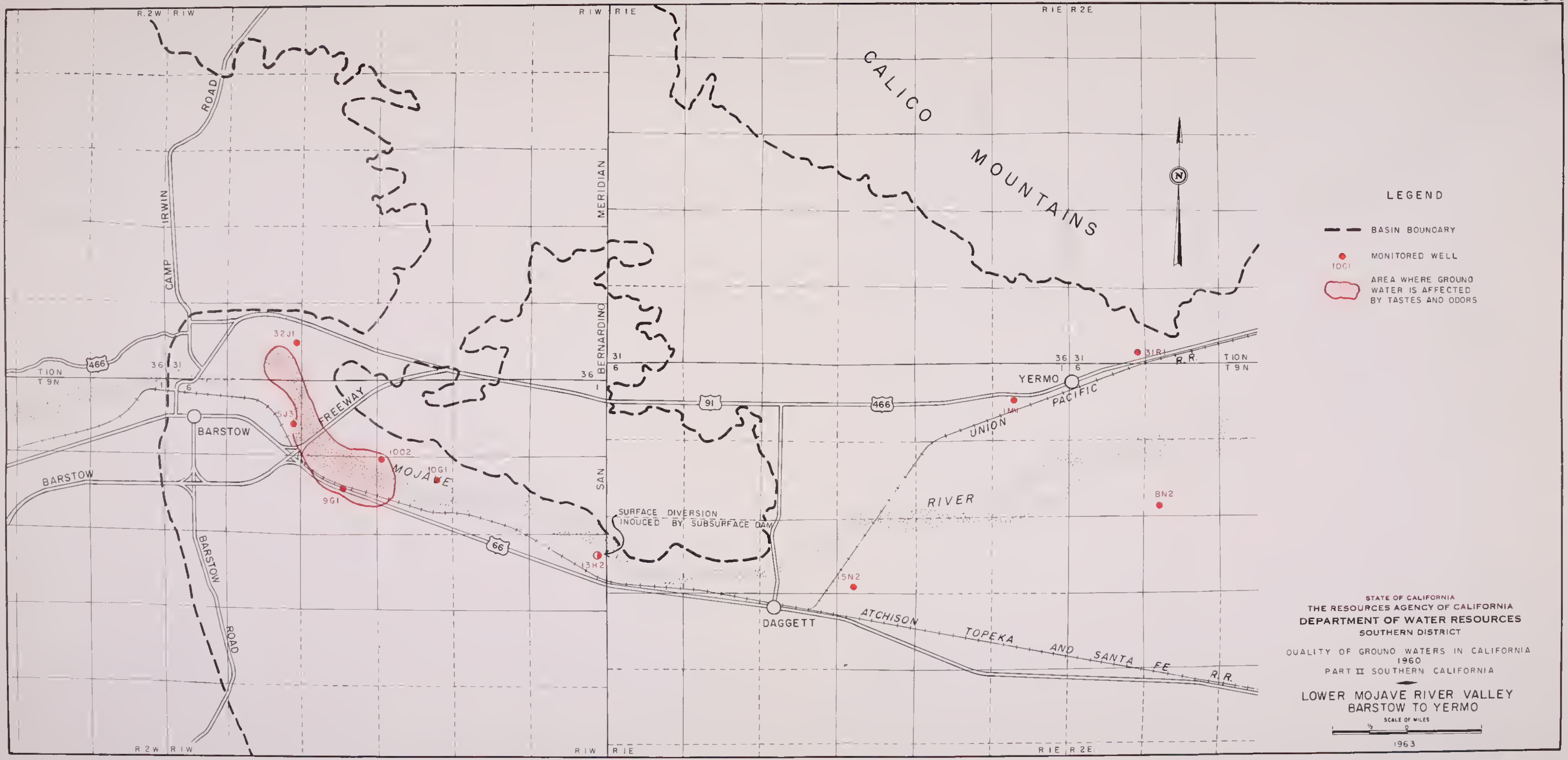
1963



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA

LOWER MOJAVE RIVER VALLEY
BARSTOW TO YERMO

SCALE OF MILES

1963

Colorado River Basin Region (No. 7)

The Colorado River Basin Region is part of the California desert area. It is bounded on the north by a series of mountain ridges which separate it from the Mojave River watershed area, on the east by the California-Nevada state line and the Colorado River, on the south by the United States-Mexico International Boundary, and on the west by the Peninsular and San Jacinto Ranges and the San Bernardino Mountains.

The region encompasses all of Imperial County, and parts of San Bernardino, Riverside, and San Diego Counties. The region's average width is about 125 miles, its average length is about 150 miles, and it encompasses an area of about 19,370 square miles.

Topography of the region is characterized by a number of broad valleys and isolated mountain ranges. Most of the region drains to the Colorado River or to the Salton Sea. However, there are some basins that have interior drainage and contain dry lakes at their lowest elevations. Some of these dry lakes are several square miles in extent. In all, 46 ground water basins have been defined in this region.

Precipitation is meager in this region. Much of the rainfall occurs in the winter season, but summer storms of cloudburst proportions are frequent. In 1960, 94 percent of the 50-year mean precipitation fell over the entire region.

Ground water is used primarily for irrigation in several basins. Colorado River water is imported for irrigation use in vast areas within the region, and where it is utilized, ground water is used primarily for domestic purposes. Some ground water is used for mining operations, for industrial uses, and for domestic uses in a number of desert resort communities.

Colorado River Basin Region (No. 7)

The Colorado River Basin Region is part of the California desert area. It is bounded on the north by a series of mountain ridges which separate it from the Mojave River watershed area, on the east by the California-Nevada state line and the Colorado River, on the south by the United States-Mexico International Boundary, and on the west by the Peninsular and San Jacinto Ranges and the San Bernardino Mountains.

The region encompasses all of Imperial County, and parts of San Bernardino, Riverside, and San Diego Counties. The region's average width is about 125 miles, its average length is about 150 miles, and it encompasses an area of about 19,370 square miles.

Topography of the region is characterized by a number of broad valleys and isolated mountain ranges. Most of the region drains to the Colorado River or to the Salton Sea. However, there are some basins that have interior drainage and contain dry lakes at their lowest elevations. Some of these dry lakes are several square miles in extent. In all, 46 ground water basins have been defined in this region.

Precipitation is meager in this region. Much of the rainfall occurs in the winter season, but summer storms of cloudburst proportions are frequent. In 1960, 94 percent of the 50-year mean precipitation fell over the entire region.

Ground water is used primarily for irrigation in several basins. Colorado River water is imported for irrigation use in vast areas within the region, and where it is utilized, ground water is used primarily for domestic purposes. Some ground water is used for mining operations, for industrial uses, and for domestic uses in a number of desert resort communities.

The ground water monitoring program in the Colorado River Basin Region is at present limited to the southern portion of the Coachella Valley. In this area, 12 wells are sampled twice a year, in June and December.

Coachella Valley Basin (7-21) (South End)

The Coachella Valley is located in Riverside County in the northerly end of a great, elongated depression named the Salton Sink. It extends from the vicinity of Banning, 75 miles southeasterly to the Salton Sea, as shown on Plate 9, "Coachella Valley (South End)." The basin ranges in width from an average of about 3 miles in the northwesterly portion to approximately 20 miles at Salton Sea, and has an area of about 680 square miles. The Salton Sea and a large part of the area monitored are below sea level.

Ground Water Occurrence. The principal ground water producing sediments of Coachella Valley are unconsolidated alluvial debris consisting of gravel, sand, and silt. Fine-grained lakebed sediments cap the alluvium in the portion of the valley which lies between the City of Indio and the Salton Sea. In this area the major aquifers are confined. A shallow zone of semiperched water that overlies the principal aquifer contains predominantly an accumulation of irrigation return water and domestic waste water. The principal aquifer is replenished by ground water moving southeastward from the upper portion of the basin where ground water is unconfined. Water wells in the monitored area yield up to 2,000 gallons per minute.

Ground Water Development and Use. Extensive use of Colorado River water for irrigation since 1949 has limited the need for ground water for irrigation in the southern part of Coachella Valley. However, ground water is still used extensively for domestic and industrial purposes. Moderate to extensive development of ground water has occurred in the upper portion of the basin where ground water, supplemented by local surface water supplies, meets all current requirements.

Major Waste Discharges. Irrigation return water constitutes the major waste discharge in the area monitored. Minor discharges are sewage treatment plant effluents used locally for irrigation, or discharged to the channel of the Whitewater River. Sanitary landfill methods are used at several sites northwest of the City of Indio for disposal of garbage and domestic rubbish.

Monitoring Program. The ground water monitoring program in Coachella Valley was instituted in 1954 to detect any changes in ground water quality produced by imported water or possible impairment resulting from movement of degraded water from a shallow aquifer into a deeper aquifer through interconnections, aquifers, or through gravel-packed or improperly constructed or destroyed wells.

Twenty-four samples were collected in 1960 from the 12 wells in the monitoring program.

Evaluation of Water Quality. Ground water in the upper portion of the valley is predominantly calcium bicarbonate in character, good to excellent in quality, and low in percent sodium. Sodium sulfate waters occur locally in the vicinity of Desert Hot Springs and Garnet, are generally unsuitable for irrigation and usually exceed drinking water standards for sulfates, total dissolved solids, and fluoride. Ground waters in the vicinity of Indian Wells and Indio contain relatively high concentrations of nitrates from an undetermined source believed to be of natural origin. Occasionally, individual wells in this area exceed the nitrate content limit of 44 ppm recommended by the United States Public Health Service for drinking water standards.

The ground water character shifts toward sodium bicarbonate or sulfate in the southerly portion of the basin, and percent sodium ranges to more than 90 in ground water from wells near Salton Sea. The high percent sodium renders the water generally unsuitable for irrigation. Limited data indicate that water in the semiperched zone is highly mineralized due to the concentration of soluble minerals.

The higher values for total dissolved solids, chloride, sulfate, and total hardness concentrations seem to be located on the western side of the basin while the higher values for fluoride concentrations seem to be located on the eastern side of the basin.

The analyses of ground water collected in 1960 show the following ranges for significant constituents:

	High	Median	Low	
Total dissolved solids	1,286	452	147	ppm
Chloride	426	56	8	ppm
Sulfate	459	110	27	ppm
Fluoride	6.1	0.6	0.4	ppm
Nitrates	106	3.4	0.1	ppm
Total hardness	706	138	18	ppm
Percent sodium	93	40	20	

Significant Water Quality Changes. Comparison of analyses of ground water samples collected in 1960 with those of 1959 indicate that the mineral constituent content increased slightly for most of the monitored wells, continuing the trend to increase evident in data for the seven years of record. Since the average ground water level for Coachella Valley in 1960 rose slightly while only 79 percent of the 50-year mean precipitation fell over this area, the increase in mineral constituents might be attributed to increased use of imported Colorado River water for irrigation.

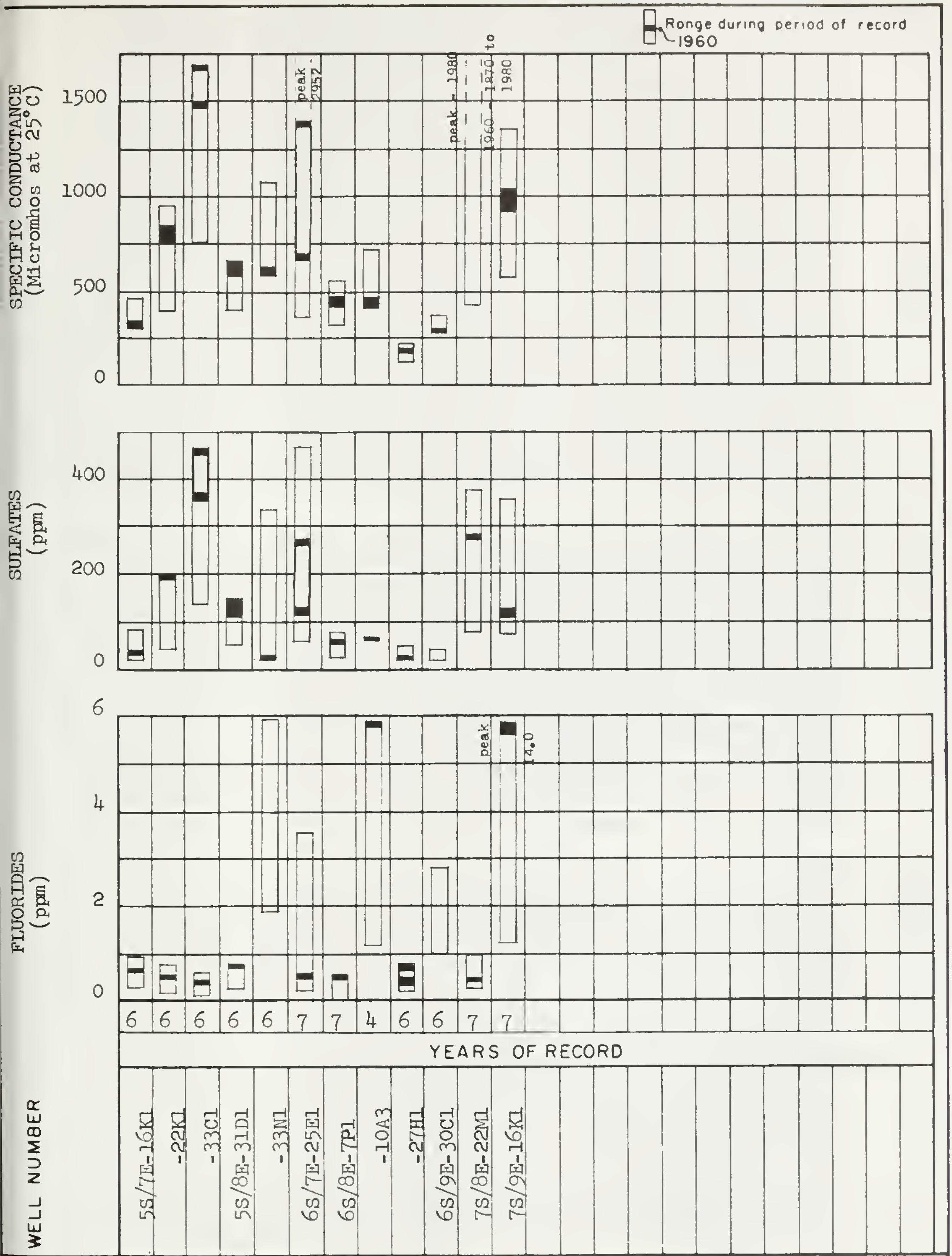
Well 5S/7E-33C1, located about four miles southwest of the City of Indio, continued to show large increases in mineral content. Nitrate content in water from this well decreased from 144 ppm in December 1958 to 88 ppm in June 1960, but then increased again to 106 ppm in December 1960, remaining much above the recommended limit of 44 ppm for drinking water. The source of the nitrates has not been determined. Sulfate content for well 5S/7E-33C1 has almost doubled, from 249 ppm in 1959 to 459 ppm in 1960, which is high for the monitored area and almost reaches the maximum permissible limit of 500 ppm adopted by the State Department of Public Health. Similar large increases for this well have occurred in total dissolved solids and in total hardness.

Well 6S/7E-25E1, located about 4-1/2 miles southwesterly of Thermal, decreased slightly in mineral constituents since 1959, but has remained at values higher than those in 1958. The total dissolved solids content illustrates this decrease.

Well 6S/8E-10A3, located about two miles north of Thermal, has shown sharp increases in chlorides; 260 ppm in May 1959 to 426 ppm in December 1960, and in sulfates; 158 ppm in May 1959 to 272 ppm in December 1960. Similar large increases have occurred in total dissolved solids and total hardness but the percent sodium has decreased from 83 percent in 1954 to 61 percent in 1959 and to 53 percent in 1960.

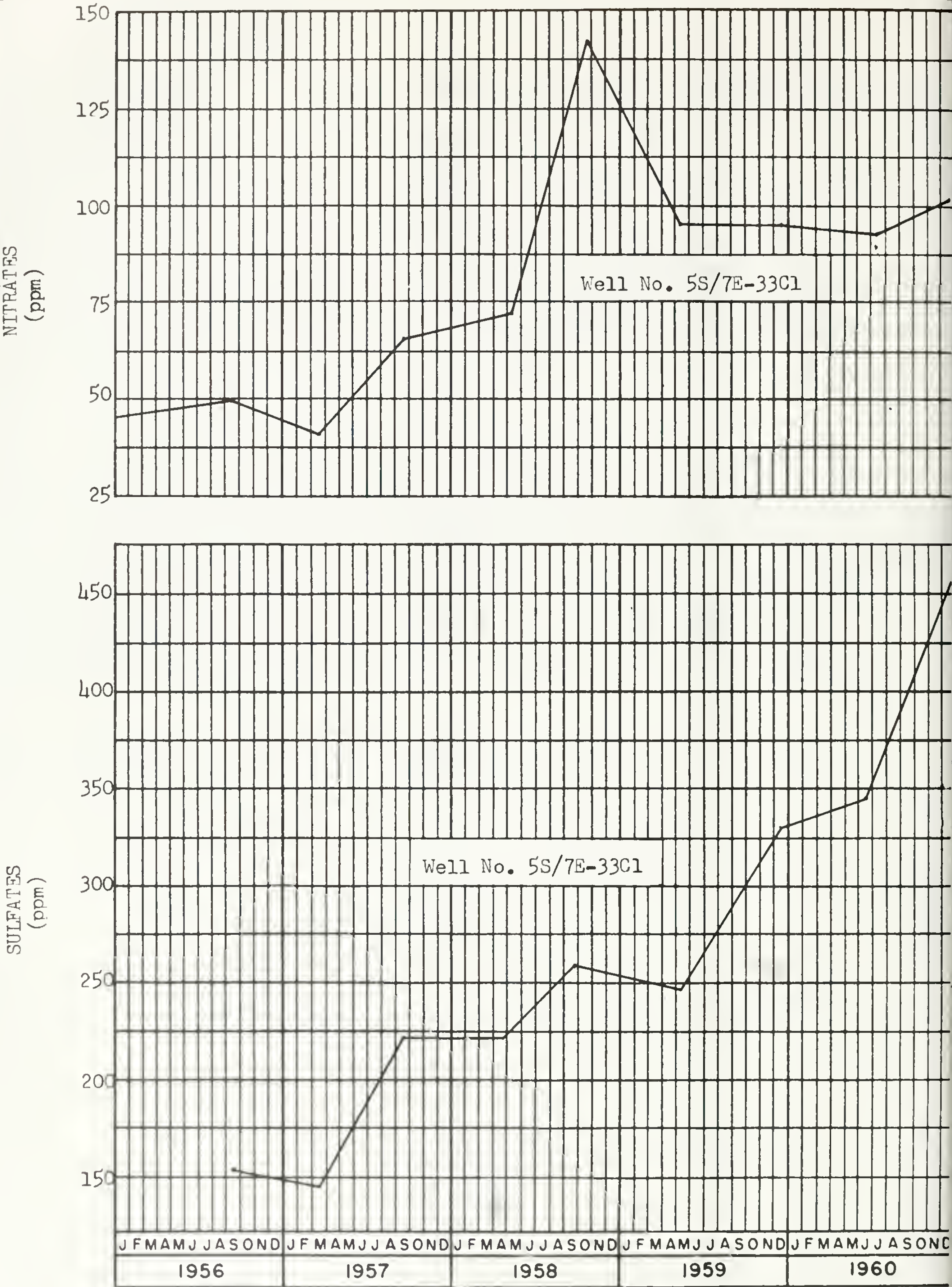
Well 7S/9E-16K1, located approximately 1-1/2 miles east of Mecca, continued to show fluctuations in concentrations of constituents as well as variations in their relative proportions. Fluoride content of water from this well ranged from 5.7 ppm to 6.1 ppm in 1960, and the percent sodium has remained consistently high for the area ranging from 89 percent to 93 percent in 1960.

The extremely variable characteristics of the ground water exhibiting impairment of quality make any attempt to identify the sources of degradation difficult. Increases in sulfate content in deeper aquifers of the lower Coachella Valley, however, are probably due to percolation of return flows from irrigation with Colorado River water.

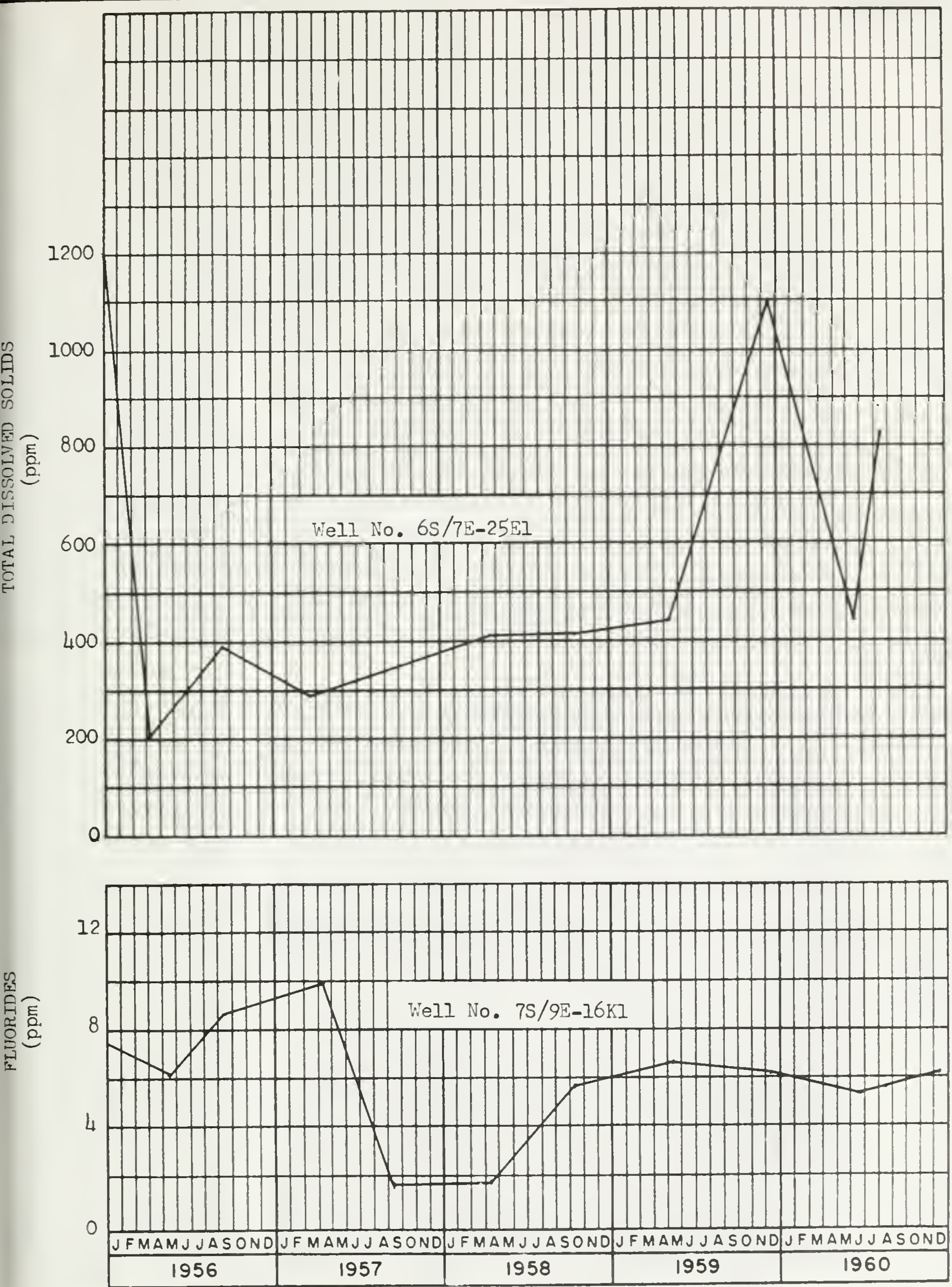


WATER QUALITY RANGES

COACHELLA VALLEY - SOUTH END

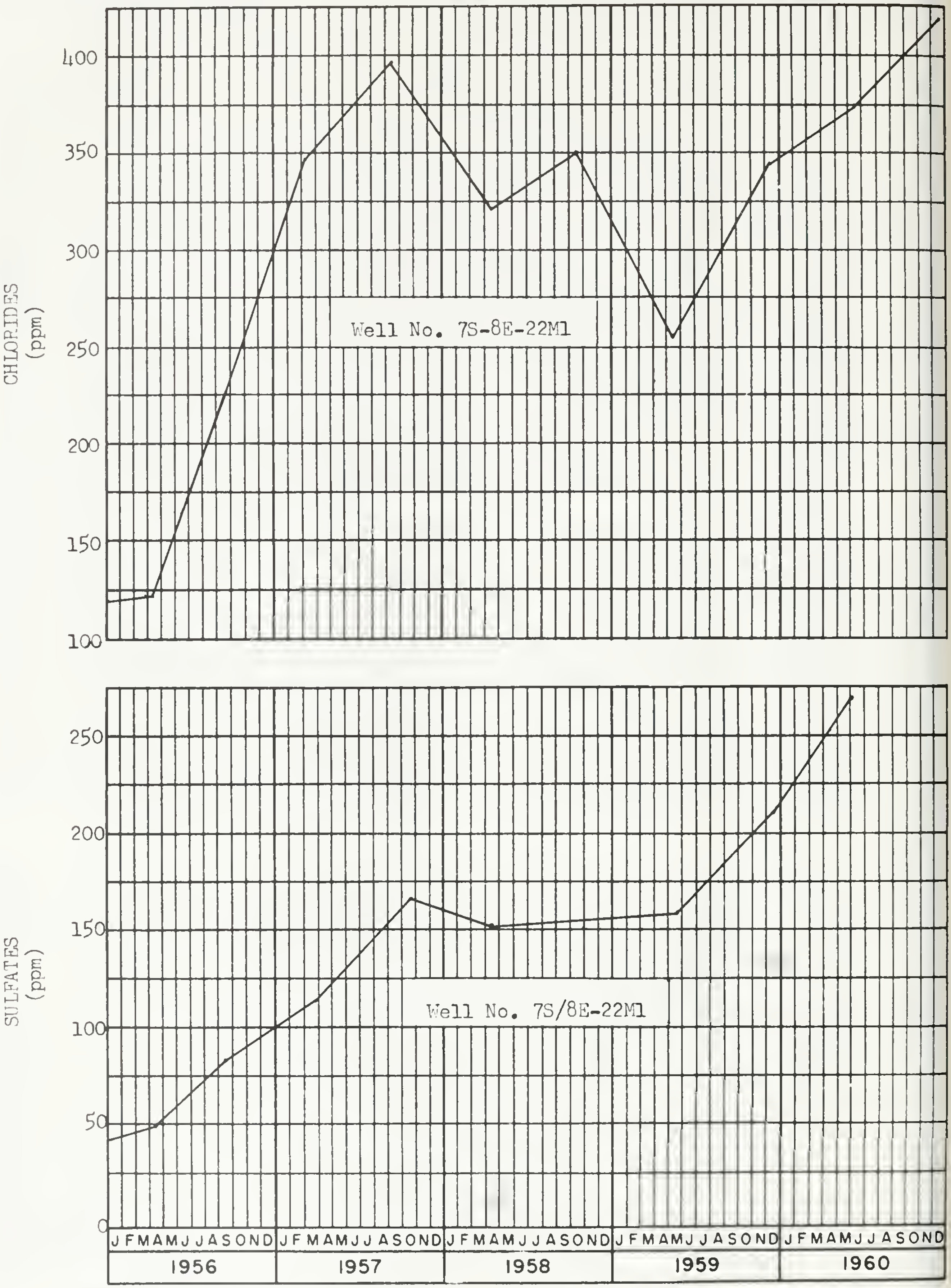


FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS
COACHELLA VALLEY - SOUTH END

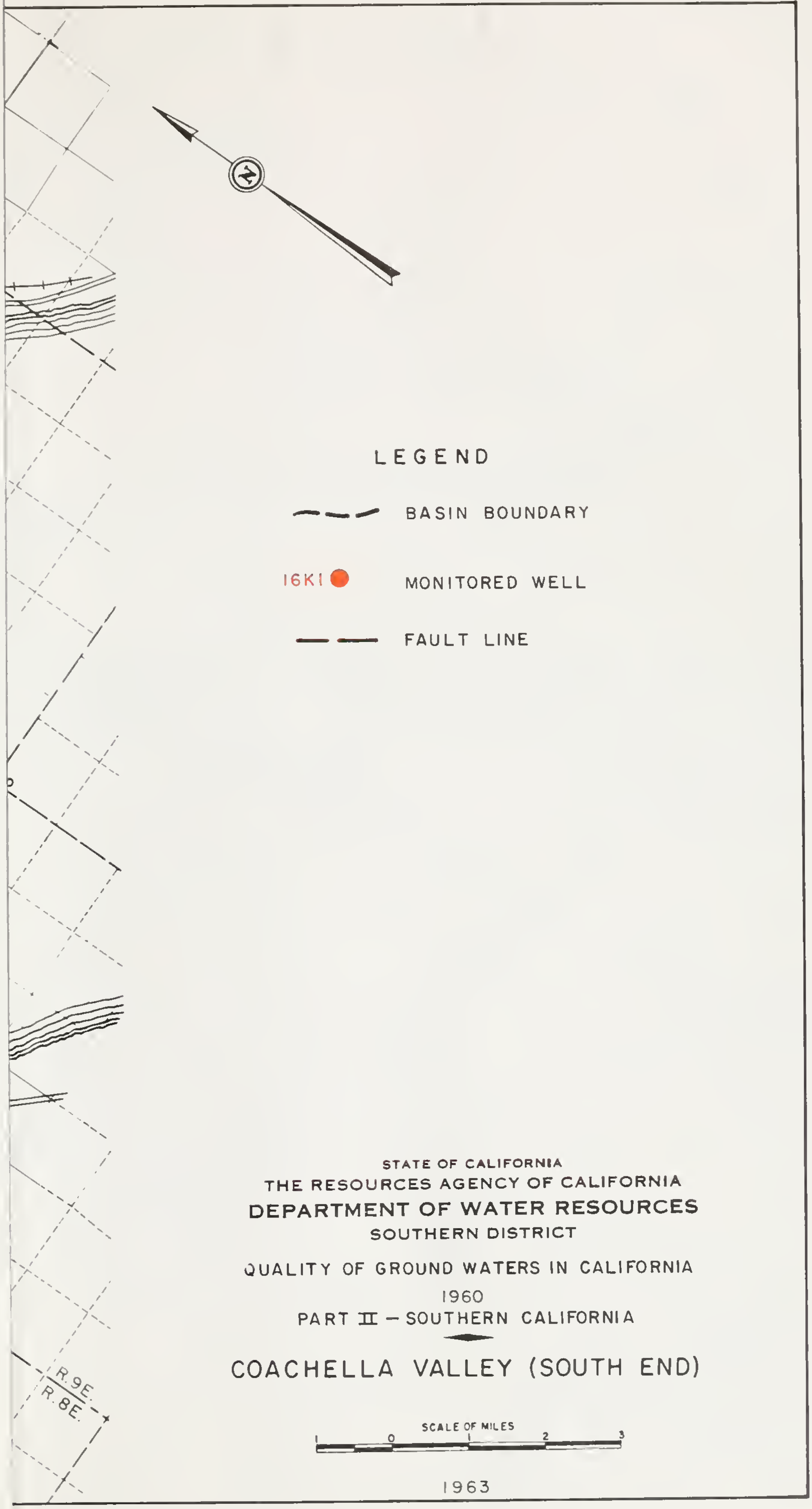


FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

COACHELLA VALLEY - SOUTH END



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS
COACHELLA VALLEY - SOUTH END

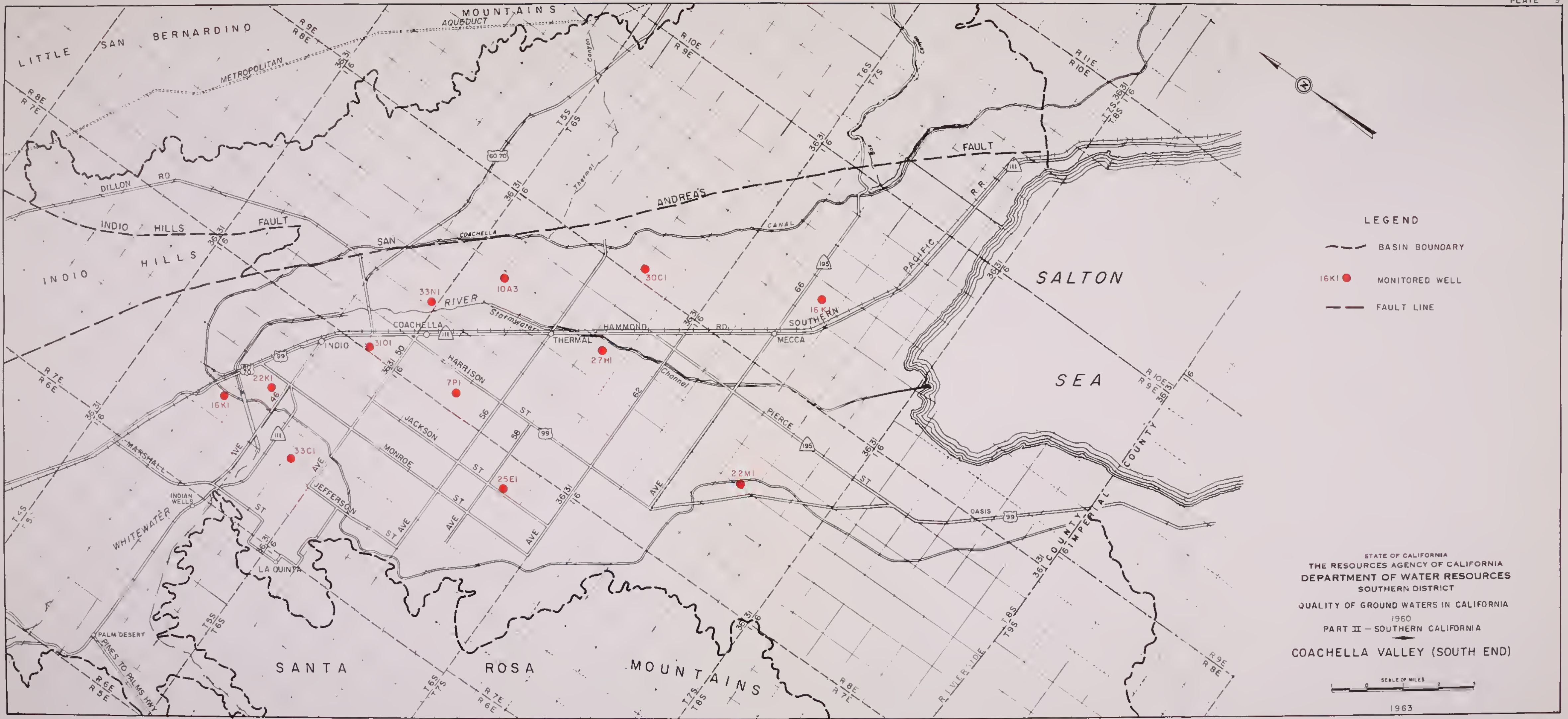


STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA

COACHELLA VALLEY (SOUTH END)

1963


LEGEND
BASIN BOUNDARY
16K1 MONITORED WELL
FAULT LINE
SALTON SEA
SAN ANDREAS FAULT
SAN BERNARDINO MOUNTAINS
LITTLE SAN BERNARDINO
METROPOLITAN AQUEDUCT
INDIO HILLS
SANTA ROSA MOUNTAINS
COACHELLA
INDIO
THERMAL
MECCA
OASIS
LA QUINTA
PALM DESERT
INDIAN WELLS
WHITEWATER RIVER
COACHELLA CANAL
SOUTHERN PACIFIC R.R.
RIVERSIDE COUNTY
IMPERIAL COUNTY
33N1
10A3
30C1
16K1
31O1
27H1
22K1
7P1
33C1
25E1
22M1
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA
COACHELLA VALLEY (SOUTH END)
SCALE OF MILES
1963

Santa Ana Region (No. 8)

The Santa Ana Region encompasses the entire drainage area of the Santa Ana River, as shown on Plate 1. It includes portions of San Bernardino, Riverside, and Orange Counties and has an area of approximately 2,800 square miles. Mountain ranges and hills bound the region on the northeast and southeast; the Pacific Ocean bounds it on the southwest, and the Los Angeles-Orange County line marks its northwestern boundary on the coastal plain. The Santa Ana River traverses the region in a southwesterly direction from the San Bernardino Mountains through the Upper Santa Ana Valley, across the Orange County Coastal Plain, and flows to the ocean near Newport Beach.

Nine ground water basins and 27 subbasins have been identified in the region, 3 of which have ground water quality problems that warrant their inclusion in the ground water monitoring program. The basins, the number of wells sampled in each, and the times of sampling are listed in the following tabulation.

Monitored area	No. of wells	Sampling time
Anaheim Basin Pressure Area (8-1.01)	22	April and September
Chino Basin (8-2.01)	8	May, October and December
Bunker Hill Basin (8-2.06)	7	March and September

The native quality of ground water in the Upper Santa Ana Valley has been generally good to marginal. Poorer quality waters are found in a few limited areas. Records of mineral analyses indicate that a small but noticeable general increase in mineral concentrations has occurred in the valley in the past thirty years.

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All waste water in the upper valley is discharged to the ground surface or to stream channels, and deep percolation of these waste waters constitutes involuntary reclamation and a source of recharge to ground water.

Surface and ground water outflow from the upper valley constitutes the principal natural source of recharge of ground water in the Orange County Coastal Plain. Most waste waters originating on the coastal plain are discharged to the ocean. Currently, Colorado River water is imported and spread along the Santa Ana River to recharge the ground water supplies; this source has provided the greatest amount of recharge water in recent years. Colorado River water is also distributed directly to the water users; however, ground water supplies about 80 percent of the water required for prevailing beneficial uses. Ground water levels remain below sea level along the coast in spite of the large ground water recharge program and sea water continues to invade the fresh ground water aquifers in the coastal plain.

The Santa Ana Region has been subject to below normal precipitation for a period of several years, broken only by above normal precipitation during the 1957-58 rainfall season. During the 1959-60 rainfall season only 67 percent of the 50-year mean precipitation fell, continuing the below normal rainfall period.

Anaheim Basin Pressure Area (8-1.01)

Anaheim Basin Pressure Area, designated East Coastal Plain Pressure Area in previous reports of this series, is the seaward portion of the Orange County Coastal Plain. It extends from the Los Angeles County line on the northwest, 15 miles along the ocean front to the San Joaquin

Hills on the south. Its average inland width is about 10 miles, and its area is about 180 square miles. The monitored area is shown on Plate 10, "Anaheim Basin Pressure Area."

The topography is that of a low, gently sloping coastal plain, with a series of mesas along the coastal margin separated by gaps. Santa Ana River traverses the plain, and flows to the ocean through Santa Ana Gap just north of Newport Beach.

Ground Water Occurrence. The major water-bearing deposits include continental and marine sediments of Recent, Pleistocene, and Pliocene age. In these sediments several aquifers have been identified, one below another. At the surface there is an unconfined body of perched water consisting largely of irrigation return and other waste waters above the confining sediments of the deeper aquifers. In order of depth these principal aquifers are the Talbert aquifer of Recent age in Santa Ana Gap, and its correlative Bolsa aquifer in the northwesterly portion of the basin, ranging from about 50 feet to nearly 200 feet below the ground surface; the Alpha, Beta, Meadowlark and Lamb aquifers in the Pleistocene deposits, ranging in depth to about 600 feet; the Pleistocene Silverado aquifer which may reach depths exceeding 1,000 feet; and the "Pico Aquifer" of Pliocene age ranging to more than 3,000 feet. In the principal aquifers well yields range up to 2,000 gallons per minute.

The principal aquifers reach their greatest depths and thicknesses in the central portion of the basin, and extend to the ocean between and beneath the coastal mesas. Faults parallel to the coastline impede sea water inflow to the Pleistocene and Pliocene aquifers but not, however, to the Recent sediments.

Ground Water Development and Use. Ground water resources are extensively developed and production exceeds safe yield. Irrigated agriculture is the principal user of ground water, but rapid urban development is supplanting former agricultural lands. Water demand is increasing along with population growth. Imported water supplements ground water used for domestic and industrial purposes. Imported water is also spread in the Santa Ana Forebay area for replenishment of ground water.

Major Waste Discharges. Municipal wastes are collected by sewers and discharged to the ocean after treatment. A limited amount of sewage treatment plant effluent is used for irrigation. Brines produced by the petroleum industry are conveyed to the ocean by pipelines. Past disposal of oil brines to unlined earth sumps continues to influence ground water quality adversely in certain areas.

Monitoring Program. The monitoring program was instituted in 1953 to detect any extension of areas adversely affected by past oil field brine disposal and to report on the status of sea-water intrusion. In 1960, 45 samples were collected from 22 wells in the program.

Evaluation of Water Quality. The mineral quality of native ground water is generally good to excellent. The character of water in the Recent and upper Pleistocene deposits is generally calcium bicarbonate. Percent sodium increases with depth to a marked degree in the lower Pleistocene and upper Pliocene deposits and the character of these waters is predominantly sodium bicarbonate.

Ranges of significant constituents from 1960 analyses of ground water samples are:

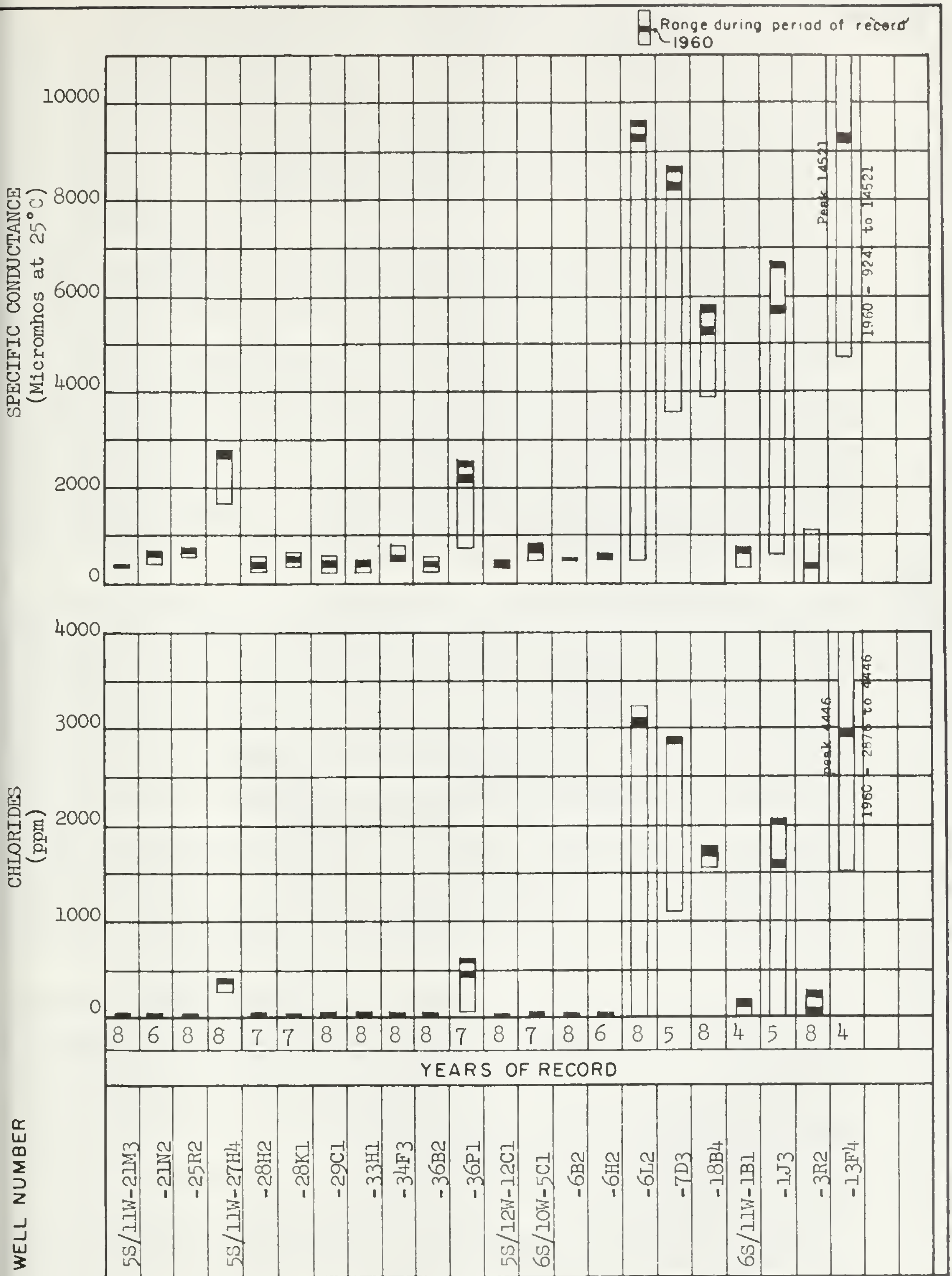
	High	Median	Low	
Total dissolved solids	10,214	589	178	ppm
Chloride	4,446	29	6.6	ppm
Sulfate	392	33	1	ppm
Total hardness	2,601	186	25	ppm
Percent sodium	84		14	

Significant Water Quality Changes. A depression of the pressure surfaces in the Talbert and Bolsa aquifers to elevations below sea level has induced intrusion of sea water into these aquifers. Analyses of ground water samples collected from the Talbert aquifer in Santa Ana Gap indicate the continued advance of sea-water intrusion in this aquifer. Ground water containing 500 ppm chloride was found as far as 3.1 miles inland from the coastline. The location of the 500 ppm chloride line is shown on Plate 9 and the continued increases of chloride ion concentration in the ground water, seaward of this line, are shown graphically for well 6S/11W-1J3, located two miles northeast of Huntington Beach.

Some of the degradation appears to be the result of past disposal of oil brines to unlined sumps on the mesas adjacent to the Santa Ana Gap. One such case is found in the analyses of ground water from well 5S/11W-36P1, located approximately two miles northeast of Huntington Beach. Chloride concentration has increased from 133 ppm in 1956 to 684 ppm in 1960. At present, the major source of ground water degradation is sea-water intrusion.

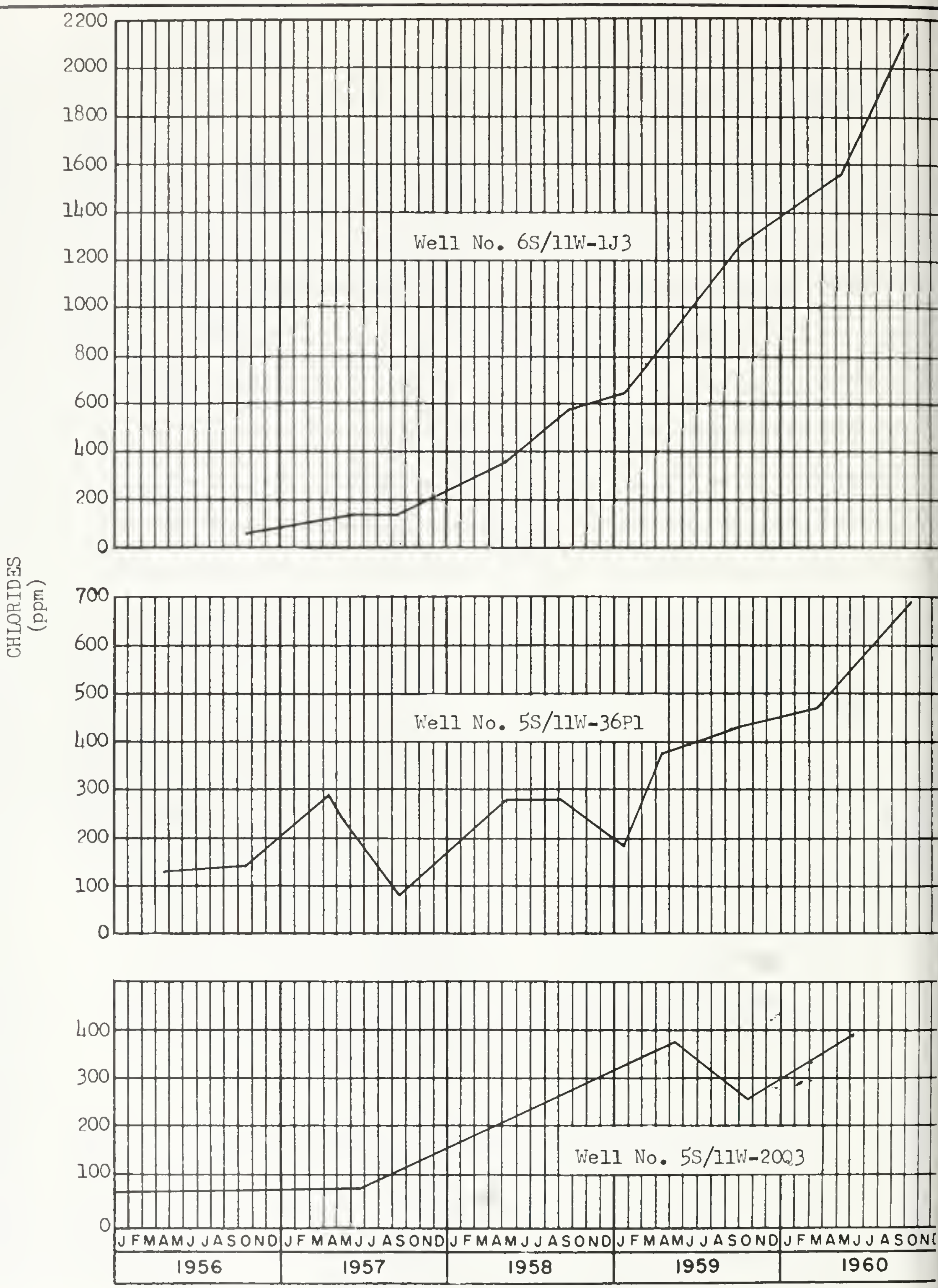
Analyses of well waters from Bolsa Chica Mesa revealed that a body of saline water was spreading in aquifers beneath the mesa, inland from the fault zone. Initial chloride increases were shown by analyses of samples from wells one-half mile landward of the faults. Chlorides for well 5S/11W-20Q3, located about one mile east of Sunset Beach, are plotted on the following chart to illustrate these increases. The source of this degradation has not been established as yet.

Although the fault zone appears to have effectively sealed off the deeper aquifers from direct invasion by sea water up to the present time, sea water and other brines may degrade the ground water in these aquifers beyond the zone of faulting by vertical percolation from the overlying shallower aquifers.



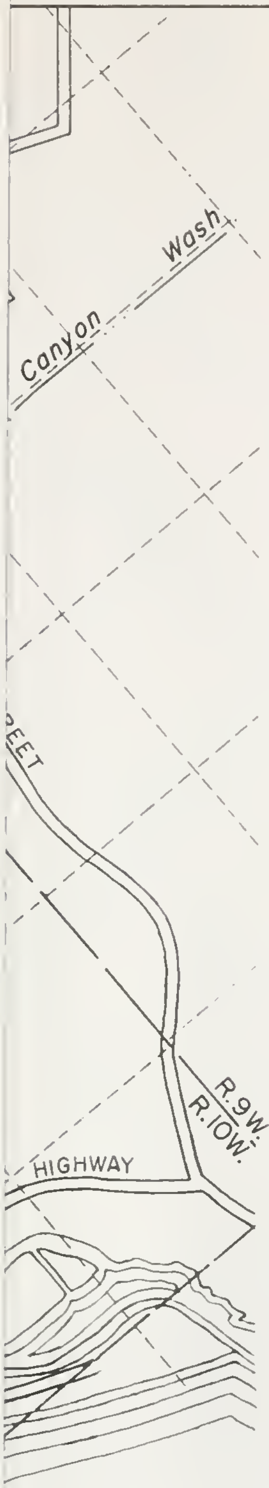
WATER QUALITY RANGES

ANAHEIM BASIN PRESSURE AREA



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

ANAHEIM BASIN PRESSURE AREA



LEGEND

3R2 ● MONITORED WELL

FAULT LINES

AREA OF CHLORIDE CONCENTRATIONS GREATER THAN 500 PPM SPRING OF 1960

STATE OF CALIFORNIA
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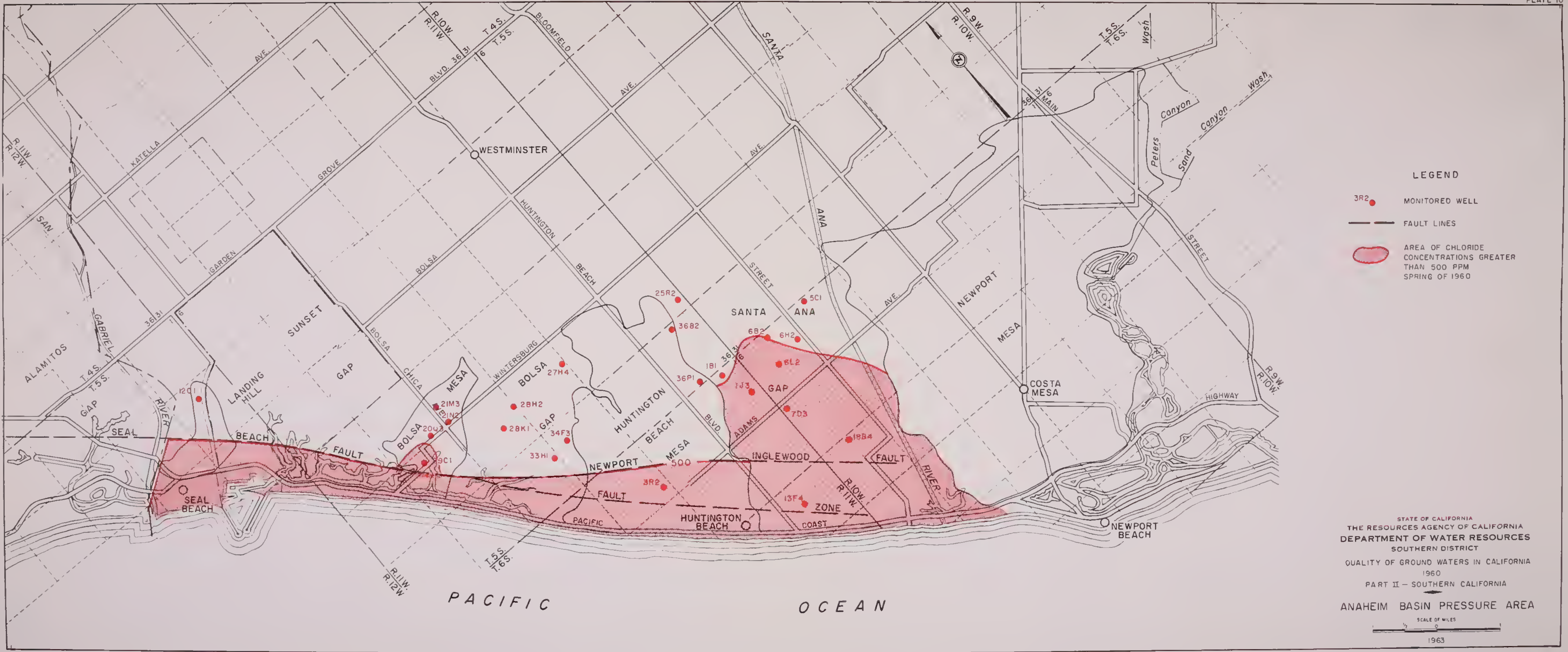
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II — SOUTHERN CALIFORNIA

ANAHEIM BASIN PRESSURE AREA

SCALE OF MILES
1 ½ 0 1

1963



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA

ANAHEIM BASIN PRESSURE AREA

SCALE OF MILES

1963

Chino Basin (8-2.01)

Chino Basin is located in the northwestern part of the Upper Santa Ana Valley. It is bounded by the San Gabriel Mountains on the north, Puente Hills on the west and southwest, Jurupa Mountains, Pedley Hills and Santa Ana River on the south, and subsurface barriers on the east. The basin is about 20 miles in length, 12 miles in width, and has an area of 237 square miles. As shown on Plate 11, "Chino Basin," the major portion of the Chino Basin is in San Bernardino County, its southern part is in Riverside County, and a small western fringe is in Los Angeles County.

The principal stream draining the Chino Basin is Chino Creek, which, together with several small streams, flows from the San Gabriel Mountains southward across the Chino Basin to the Santa Ana River. The Santa Ana River flows westerly along the southern margin of the basin.

Ground Water Occurrence. Ground water is obtained from the alluvial sediments in the basin. These sediments are of Recent and Pleistocene age and comprise, essentially, a single aquifer. In the upper portion of the valley the sediments consist chiefly of coarse gravels, and ground water is unconfined. Along the southwestern margin of the valley, ground water is confined under pressure by fine-grained flood plain sediments. Faults along the northeasterly boundary of the basin impede ground water inflow from adjacent basins. Wells yield from 135 gpm to more than 1,800 gpm.

Ground Water Development and Use. Development of ground water for agricultural and municipal uses is extensive, and a general condition of overdraft exists. The greatest amount is used by irrigated agriculture;

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Ground Water Development and Use. Development of ground water for agricultural and municipal uses is extensive, and a general condition of overdraft exists. The greatest amount is used by irrigated agriculture;

however, the development of industrial and residential areas is increasing the demand on the ground water supply. Colorado River water is imported to supplement ground water supplies, and minor amounts of ground water are imported to or exported from the basin.

Major Waste Discharges. Domestic sewage and industrial waste water consisting of cooling water, food processing, and aircraft washing wastes, constitute the major waste discharges. Almost all waste waters in the basin are returned to the land for disposal or are used for irrigation. A substantial quantity of waste water is imported from the City of Riverside for irrigation, while a minor amount of waste water is exported to the Pomona tri-city sewage treatment plant in Pomona.

Hexavalent chromium and phenolic compounds in ground water have been traced to industrial waste disposal in the past. In 1960, there were no indications that these constituents continued to present water quality problems.

Monitoring Program. The monitoring program was instituted in 1953 to detect possible impairment of ground water quality that could result from local disposal of domestic and industrial wastes, deep percolation of irrigation water, or use of water imported from the Colorado River. Wells for monitoring were selected from among wells located near signigicant waste discharges. In 1960, 21 samples were collected from 8 monitoring wells.

Evaluation of Water Quality. The native ground water quality was generally good to excellent for all prevailing beneficial uses. It was predominantly calcium-bicarbonate in character and moderately hard to very hard water. The waters were usually class 1 for irrigation use and acceptable for domestic use.

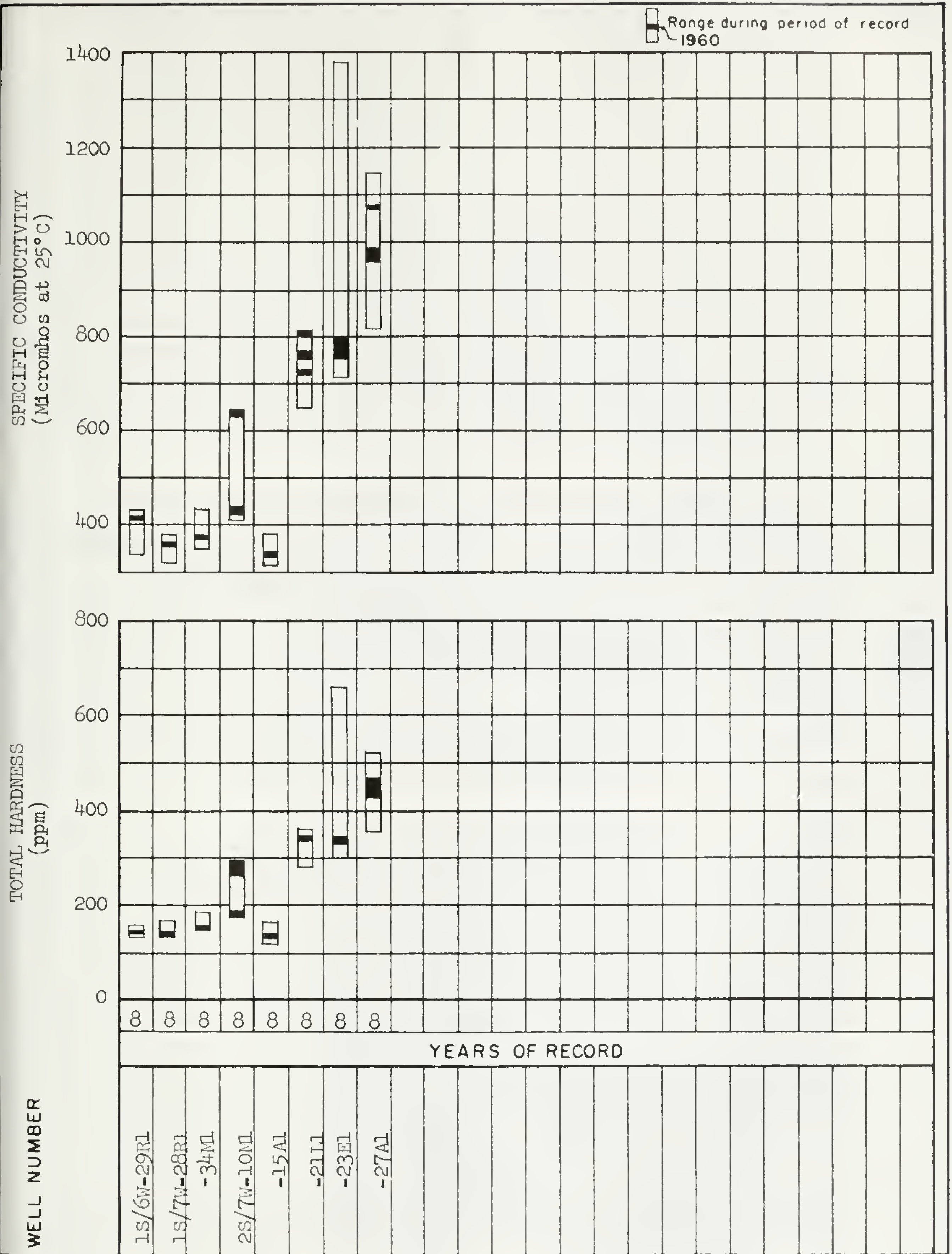
Harder waters containing greater concentrations of total dissolved solids are found in the southwestern portion of the basin, reflecting the high mineral content of runoff from Puente Hills.

Ranges for significant constituents in 1960 are:

	High	Median	Low
Total dissolved solids	670	423	210 ppm
Chloride	57	32	6 ppm
Nitrates	70	36	3 ppm
Sulfates	59	27	5 ppm
Total hardness	465	317	140 ppm
Percent sodium	26		14

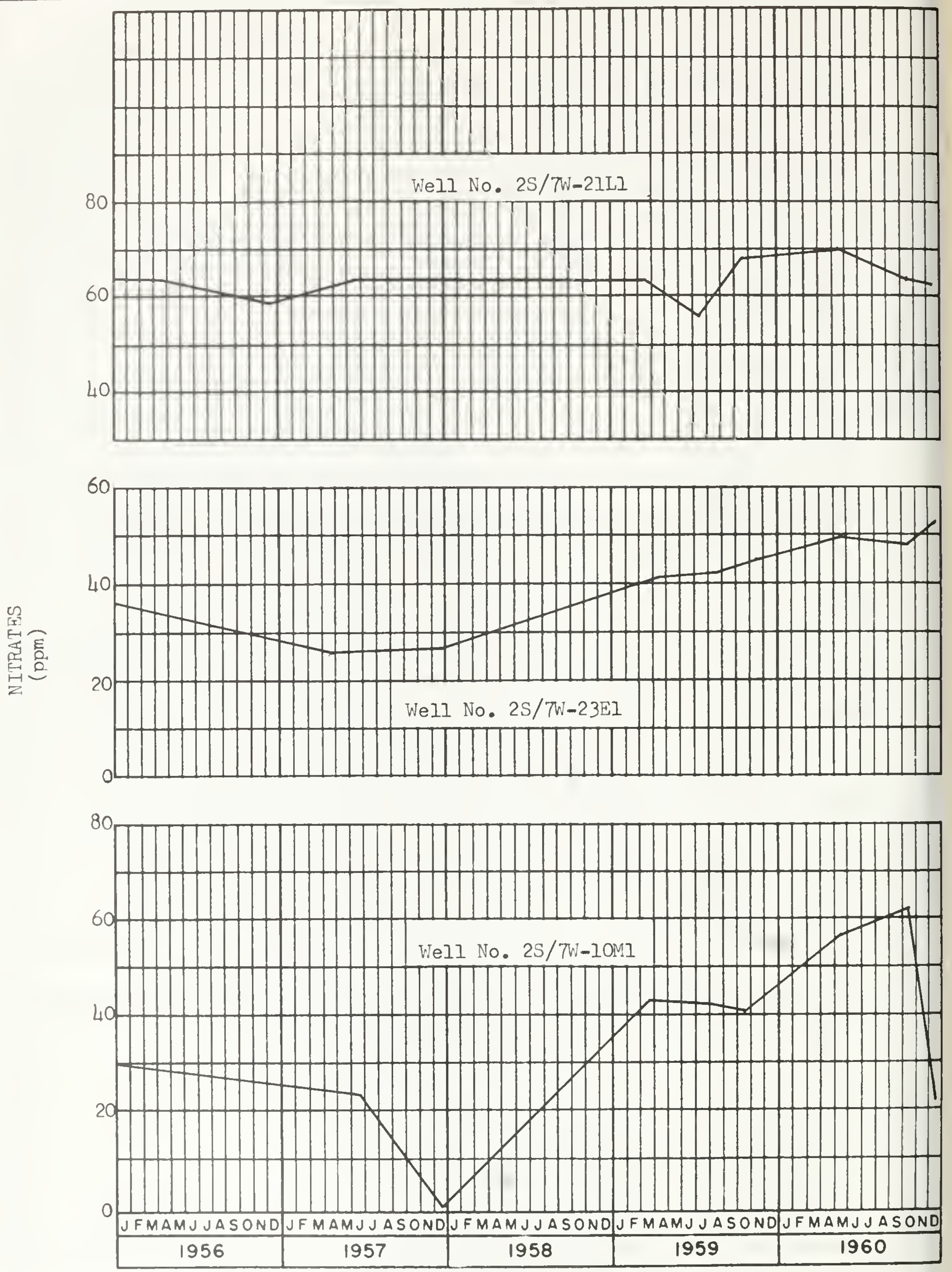
Significant Water Quality Changes. Analyses of ground water samples collected in 1960 indicate that a slight increase had occurred in total dissolved solids, chloride, and nitrate content in the preceding year. Increases in total dissolved solids and chloride are believed to be due to use and reuse of water in the basin. Moderately high nitrate values found in well waters in the northwestern portion of the valley, where there are no known local waste discharges, have been attributed to overfertilization of crops. In the southeastern portion of the valley, ground water from wells in the vicinity of sewage treatment plant discharges have shown nitrate content exceeding the recommended limit of 44 ppm for drinking water at various times over the eight years of record. Analyses of ground water samples from well 2S/7W-23E1 located about six miles southeasterly from Chino shows a record of 94 ppm nitrate in 1953 to 25 ppm in 1957 to 52 ppm in 1960. Ground water from well 2S/7W-21L1, located about five miles south of Ontario, shows a nitrate content of 48 ppm in 1954 increasing to 70 ppm in 1960, which is the high for the monitored area. Ground water from well 2S/7W-10M1, located approximately 4-1/2 miles east of Chino, exhibited an increase in nitrates from 23 ppm in 1953 to 62 ppm in October 1960 and then a sudden drop to 22 ppm in December 1960. These changes are illustrated on the accompanying charts.

A department report on "Ground Water Quality Objectives, Chino Basin," March 1957, to the Santa Ana Regional Water Pollution Control Board concluded that most of the industrial waste disposal problems had been eliminated through controls instituted by the board. Examination of all ground water quality data reveals that a slow but continuing increase in dissolved minerals is occurring. Subnormal rainfall, 63 percent of the 50-year mean precipitation in the 1959-60 rainfall season, with the subsequent drop in ground water levels, plus past and present local disposal of substantially all waste water and the resultant reuse of ground water, promises to maintain this trend of increasing mineralization.

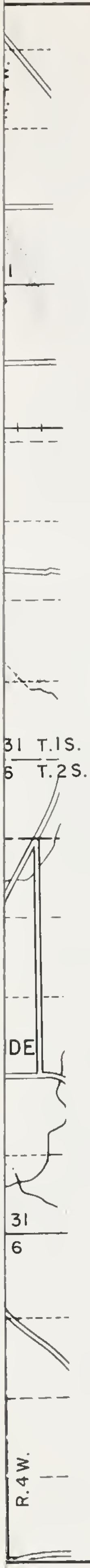


WATER QUALITY RANGES

CHINO BASIN



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS
CHINO BASIN



LEGEND

BASIN BOUNDARY

● 10M1 MONITORED WELL

FAULT LINE

STATE OF CALIFORNIA
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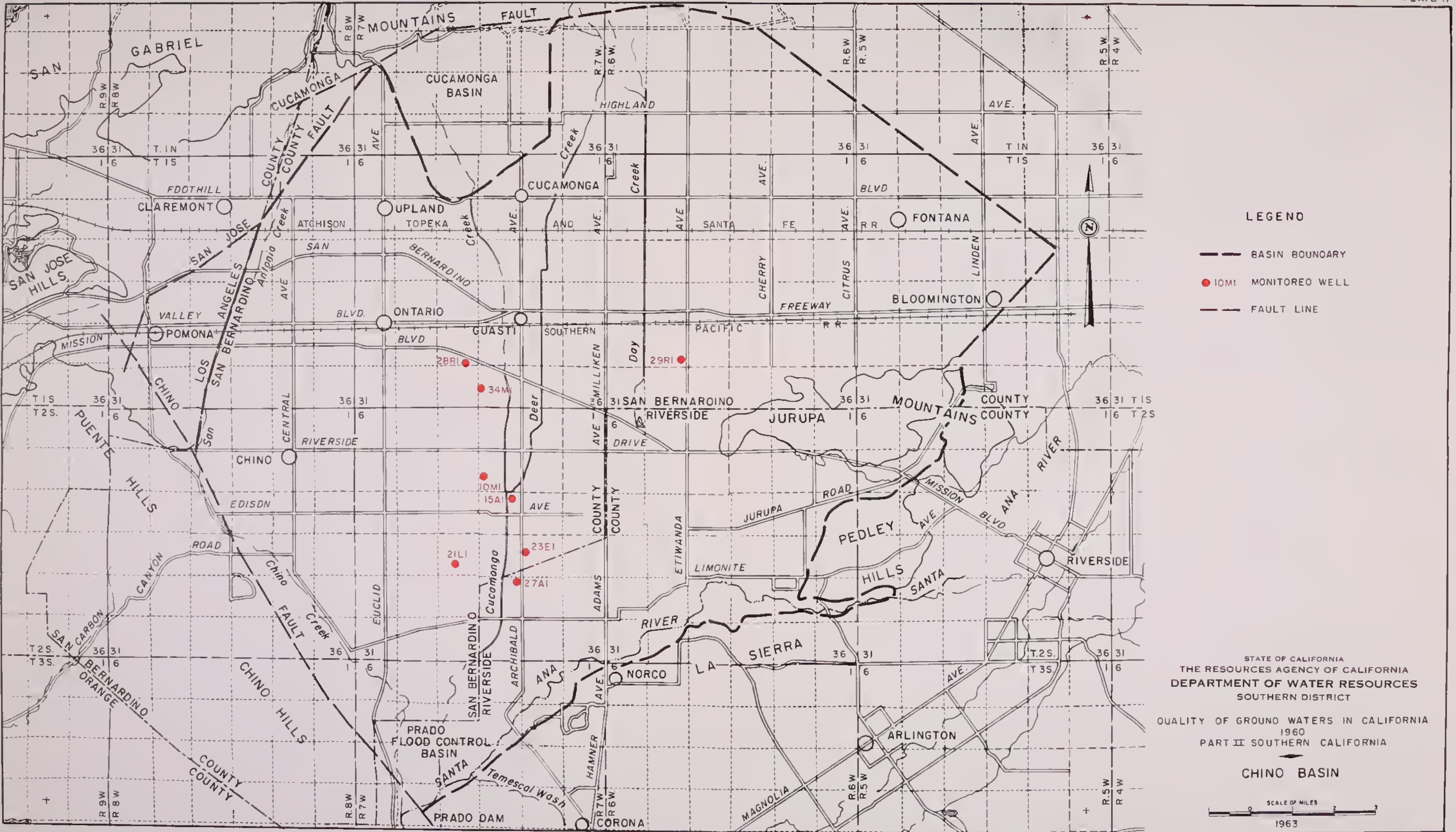
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA

CHINO BASIN

SCALE OF MILES
1 0 1 2 3

1963


LEGEND
BASIN BOUNDARY
10M1 MONITORED WELL
FAULT LINE
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II SOUTHERN CALIFORNIA
CHINO BASIN
SCALE OF MILES
0 1 2 3
1963
SAN GABRIEL MOUNTAINS
FAULT
CUCAMONGA FAULT
CUCAMONGA BASIN
HIGHLAND
AVE.
FOOTHILL
BLVD
CLAREMONT
UPLAND
CUCAMONGA
FONTANA
ATCHISON
TOPEKA
AND
SANTA
FE
R R
SAN JOSE HILLS
SAN JOSE
SAN BERNARDINO
FREEWAY
BLOOMINGTON
VALLEY
BLVD.
ONTARIO
GUASTI
SOUTHERN
PACIFIC
POMONA
MISSION
LOS ANGELES
SAN BERNARDINO
28R1
34M1
29R1
MILLIKEN
Day
Deer
Creek
SAN BERNARDINO
RIVERSIDE
JURUPA
MOUNTAINS
COUNTY
PUENTE
CHINO
CENTRAL
RIVERSIDE
DRIVE
CHINO
HILLS
10M1
15A1
EDISON
AVE
JURUPA
ROAD
MISSION
BLVD.
PEDLEY
HILLS
SANTA ANA RIVER
RIVERSIDE
ROAD
CANYON
23E1
21L1
27A1
Cucamonga
ETIWANDA
LIMONITE
ADAMS
EUCLID
ARCHIBALD
Chino Creek
FAULT
SAN CARBON
SAN BERNARDINO
ORANGE
CHINO HILLS
LA SIERRA
NORCO
PRADO FLOOD CONTROL BASIN
SANTA ANA
Temescal Wash
HAMNER
ARLINGTON
MAGNOLIA
PRADO DAM
CORONA
CHERRY
CITRUS
LINDEN
T. 1 N
T. 1 S
T. 2 S.
T. 3 S.
R. 9 W
R. 8 W
R. 7 W
R. 6 W
R. 5 W
R. 4 W

Bunker Hill Basin (8-2.06)

The Bunker Hill Basin is situated in the Upper Santa Ana Valley, and extends 20 miles along the lower slopes of the San Bernardino Mountains which bound it on the north. Its average width is about 8 miles, and its area is about 92 square miles. The basin boundaries are shown on Plate 12, "Bunker Hill Basin."

The Santa Ana River and its tributary streams, including Warm Creek and City Creek, drain the basin. The river flows southwesterly across the basin and into the Colton Basin through the Colton Narrows southwest of the City of San Bernardino.

There are a number of faults in the basin which affect the movement of ground water. The most important of these is the San Jacinto fault which forms the southwestern boundary of the basin and controls subsurface outflow into the Colton Basin.

Ground Water Occurrence. Ground water is obtained from alluvial sediments of Recent and Pleistocene age which increase in thickness from zero at the foot of the mountains to about 1,000 feet in the southwestern portion. Near the mountains, coarse gravels represent the sediments in coalescing alluvial cones below the mountain canyons and free ground water conditions prevail. In the southwest portion, interbedded permeable and relatively impermeable strata create an area of confined ground water. Well yields range from 180 to 1,200 gpm.

Ground Water Development and Use. Ground water is developed extensively for agricultural and municipal needs; it provides for almost all local requirements and, in addition, large volumes are exported from the basin for use in adjacent areas.

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Ground Water Development and Use. Ground water is developed extensively for agricultural and municipal needs; it provides for almost all local requirements and, in addition, large volumes are exported from the basin for use in adjacent areas.

Major Waste Discharges. Industrial wastes and domestic sewage constitute the major waste discharges. These wastes are discharged to the surface of the land or to stream channels.

Monitoring Program. The monitoring program was instituted in 1953 after an investigation by the Division of Water Resources found that waste discharges to the ground surface from a zeolite manufacturing plant near the City of San Bernardino, had adversely affected the ground water in the vicinity of the plant. Additional wells were later selected to monitor possible effects on ground water quality of discharges of waste waters to the land from a military air base and from the City of Redlands sewage treatment plant. In 1960, 21 samples were collected from 7 monitoring wells.

Evaluation of Water Quality. The character of ground water in the Bunker Hill Basin is predominantly calcium carbonate. It ranges from moderately hard to very hard water, but meets the standards recommended for mineral quality of drinking water, and is class 1 for irrigation use.

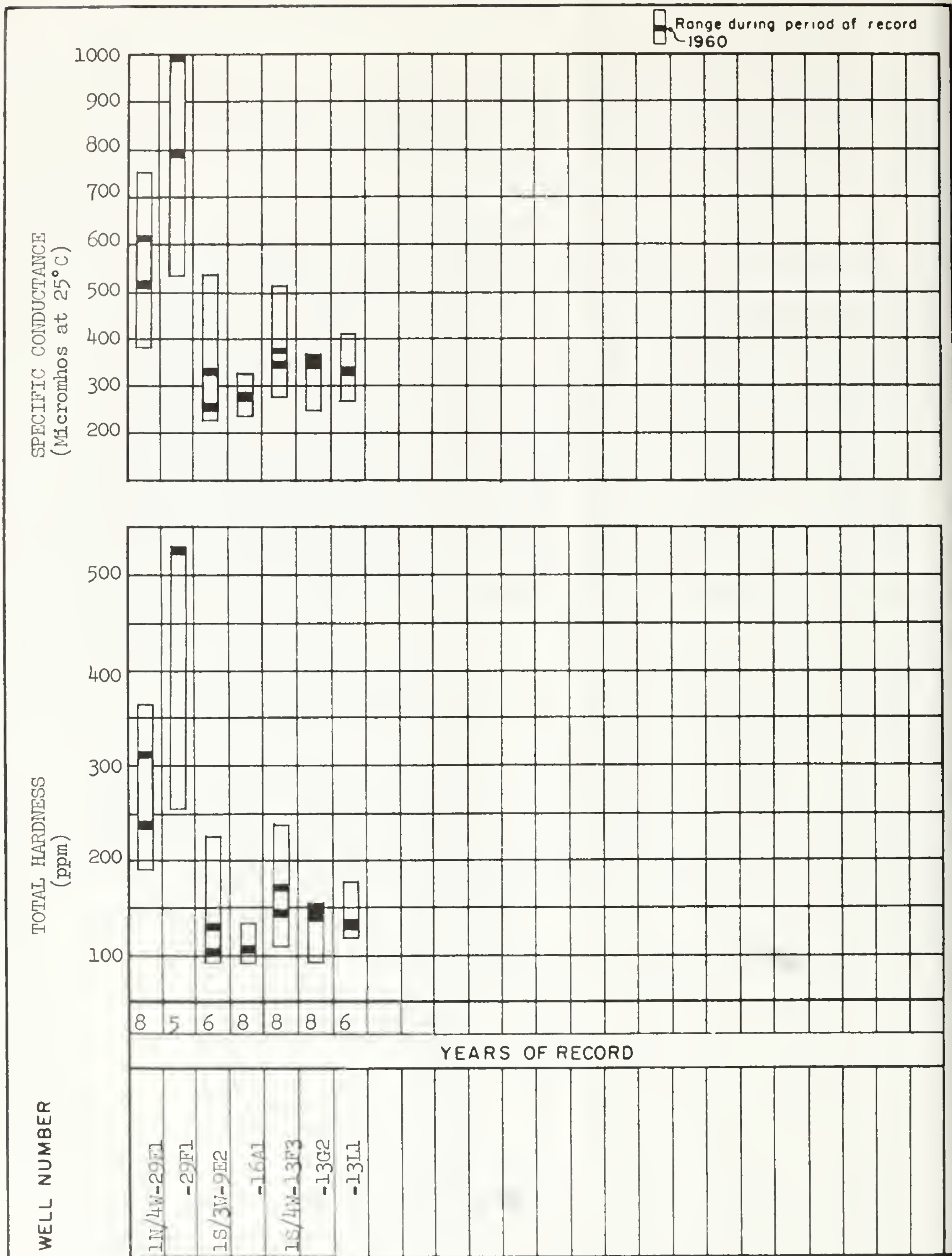
Ranges in concentrations of significant constituents in 1960 are:

	High	Median	Low
Total dissolved solids	739	216	155 ppm
Chlorides	18	11	4 ppm
Nitrates	23	6	3 ppm
Sulfates	313	24	6 ppm
Total hardness	530	151	100 ppm
Percent sodium	25	17	4

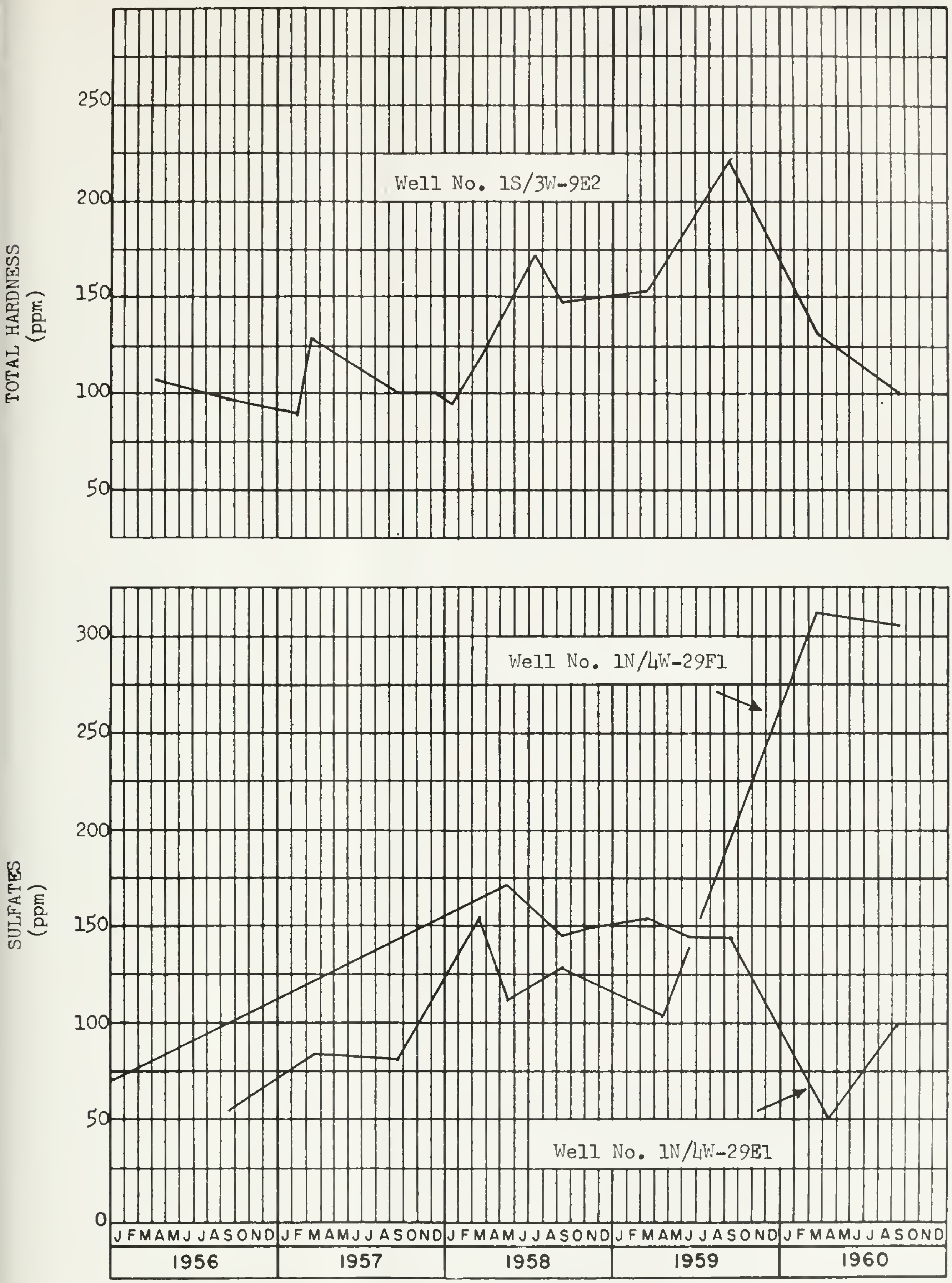
Significant Water Quality Changes. Comparison of mineral analyses of ground water samples obtained in 1960 with those of the preceding seven years indicates that minor fluctuations in mineral concentrations have occurred, but that there is no definite indication of any trend except as noted in the following discusstion.

Ground water from well 1N/4W-29E1, located about one mile south of the disposal area of the Culligan Zeolite Company, and well 1N/4W-29F1, located three-fourths mile southeast, have shown marked increases in mineral content up to 1959. The mineral analyses show that the increase in mineralization was due primarily to gains in calcium and sulfate concentrations. In 1960, water from well 1N/4W-29E1 decreased sharply in sulfates from the 1959 value of 145 ppm to 53 ppm in April and then increased back up to 96 ppm in September. In contrast, water from well 1N/4W-29F1 continued its rise in sulfates at an even greater rate. Sulfates rose from 101 ppm and 196 ppm in 1959 to 315 ppm in March and 305 in September of 1960, thus exceeding the recommended value of 250 ppm for drinking water set by the United States Public Health Service.

Water from well 1S/3W-9E2, located about three miles north of Redlands, exhibited a fairly steady increase in total hardness to its 1959 value of 220 ppm and then decreased sharply to 133 ppm in March and 100 ppm in September of 1960. These lower values illustrate a trend of the water in this well to return to the mineral content that existed prior to 1957.



WATER QUALITY RANGES
BUNKER HILL BASIN



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS
BUNKER HILL BASIN

LEGEND

BASIN BOUNDARY

9E2 ● MONITORED WELL

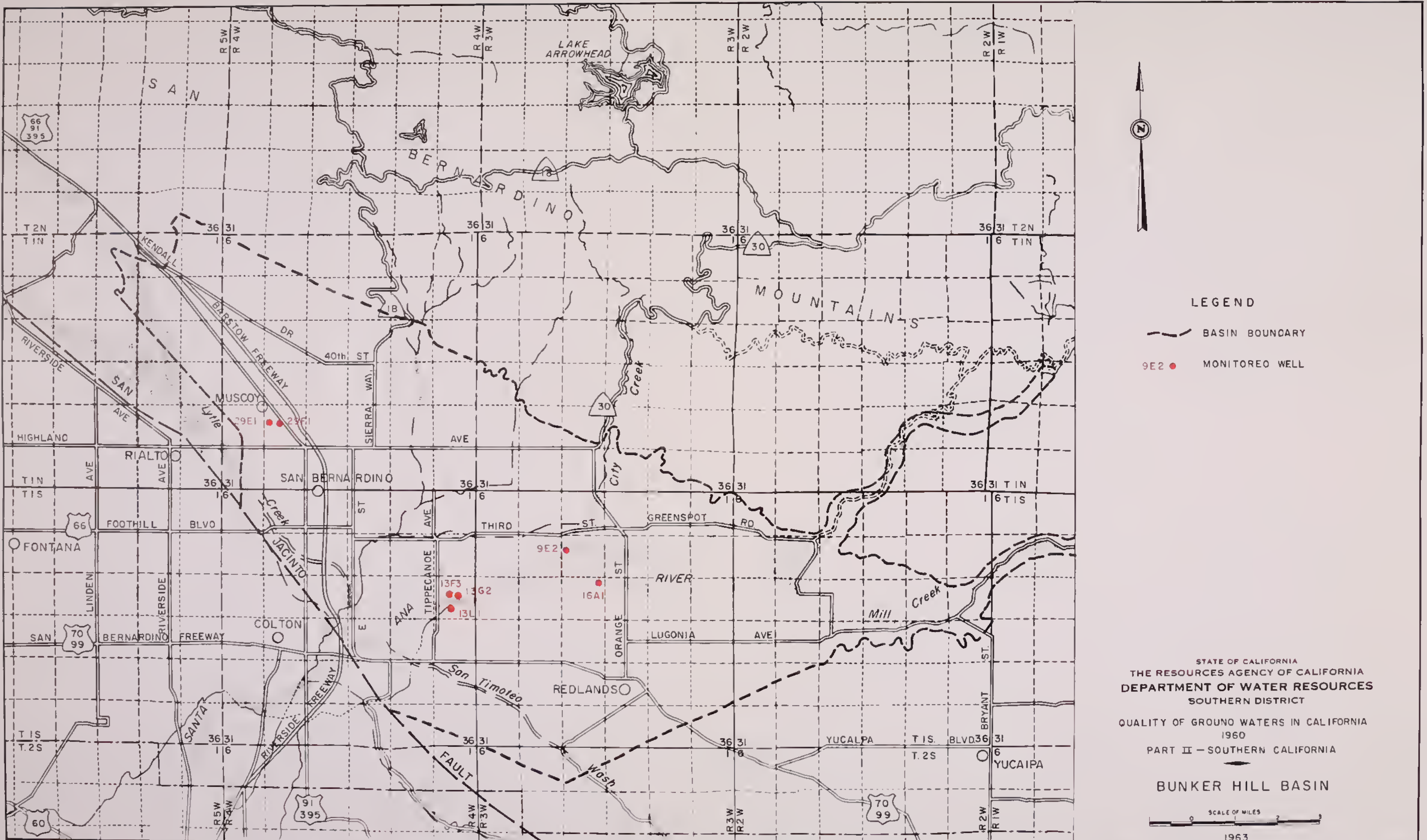
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II — SOUTHERN CALIFORNIA

BUNKER HILL BASIN

SCALE OF MILES
1 0 1 2 3

1963



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II — SOUTHERN CALIFORNIA

BUNKER HILL BASIN

SCALE OF MILES

1963

San Diego Region (No. 9)

The San Diego Region is the drainage area of streams flowing to the ocean between the City of Corona Del Mar in Orange County and the California-Mexico boundary. As shown on Plate 1, its boundaries include portions of Orange, Riverside, and San Diego Counties. It extends about 90 miles along the coast, its average width is about 45 miles, and its area is approximately 3,830 square miles. Most of its surface is mountainous or hilly except for a narrow coastal belt which slopes gently to the ocean and consists of a number of wave-cut terraces or mesas.

Ground water is found in the alluvium of the stream valleys or shallow alluvial fill of inland valleys. Fifty-four basins have been identified in the region; however, only three areas are included in the monitoring program. These three areas, the number of wells sampled in each, and the sampling times are listed in the following tabulation.

Monitored area	No. of wells	Sampling time
San Luis Rey Valley Mission Basin (9-7.01)	12	February and December
El Cajon Valley (9-16)	7	April and December
Tia Juana Valley Basin (9-19)	9	April and November

Precipitation in the region during the 1959-1960 season was below normal, 75 percent of the 50-year mean precipitation. Both surface and underground water storage declined. Only small increases in average mineral content are indicated by analyses of ground water samples collected in 1960 for ground waters in the San Luis Rey Valley Mission Basin or El Cajon Valley, but increases in the ranges of certain constituents showed that areal differences in quality within these basins were becoming more prominent. The small change in average quality from 1959 to 1960 is

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Increasing availability and distribution of Colorado River water in the coastal areas has minimized dependence on local ground water supplies. However, the ground water basins are gaining in importance as reservoirs for storage of excess import water as well as local water.

Mission Basin, San Luis Rey Valley (9-7.01)

The Mission Basin occupies the lower, or oceanward, end of the San Luis Rey River Valley in San Diego County. It extends from the ocean eight miles inland to the Bonsall Narrows. The width of the basin varies from one to two miles and its area is about six square miles. Its boundaries are shown on Plate 13, "Mission Basin, San Luis Rey Valley."

Ground Water Occurrence. Ground water is obtained primarily from the unconsolidated Recent and Pleistocene age alluvium along the San Luis Rey River Channel. The Recent alluvium, consisting of highly permeable sands and gravels, is chiefly unconfined, but near the ocean fine-grained sediments partially confine ground water in that area. The alluvium extends into the ocean and is open to intrusion by sea water.

Underlying and flanking the alluvium are deposits of marine sediments consisting of slightly cemented sands with occasional beds of shale or sandy shale. These marine deposits, which are only slightly permeable, contain connate water, poor in quality and high in chlorides.

The yield from wells in the alluvium range up to 2,180 gpm and average 500 gpm.

Ground Water Development and Use. Ground water is extensively developed for irrigation and about 25 percent of the municipal water requirements of the cities of Oceanside and Carlsbad is obtained from wells in the basin. As a result of these developments, a condition of overdraft exists in the coastal portion of the basin.

Major Waste Discharges. The major waste discharge is the effluent from the City of Oceanside sewage treatment plant that is imported to the basin by pipeline and pumped into Whelan Lake. The effluent has been used for irrigation following oxidation treatment in Whelan Lake. In October 1958, ground water replenishment operations were begun by discharge of effluent from overflow of the lake to spreading grounds in the San Luis Rey River Channel. This continued through 1959 and 1960.

A significant waste discharge occurred from a sand and gravel washing operation which utilizes saline ground water. Formerly the waste was discharged at a point about 0.5 mile from the ocean into a single pond, but in 1959 and in 1960 it was discharged to the river channel in a spreading operation.

Monitoring Program. A ground water monitoring program was instituted in 1953 to study water quality effects resulting from sea-water intrusion, inflow of connate waters from marine sediments which underlie and flank the river alluvium, and salt balance. During 1960, 21 samples were obtained from 12 monitoring wells.

Evaluation of Water Quality. The character of water in the basin is extremely variable. Calcium, sodium, bicarbonate, and chloride ions, predominate. The water is hard to very hard and high in total dissolved solids and chloride. The quality varies from good to unacceptable according to the drinking water standards and from class 2 to 3 for irrigation. Analyses of ground water samples obtained in 1960 show the following ranges for significant mineral constituents:

	High	Median	Low
Total dissolved solids	3,355	1,400	601 ppm
Chlorides	1,298	420	138 ppm
Sulfates	515	212	78 ppm
Total hardness	1,555	714	324 ppm

Significant Water Quality Changes. Comparison of ground water analyses collected in 1960 with those of 1959 show that ground water levels have declined and a general deterioration of quality has occurred. This is due in part to use and reuse of the ground water for irrigation, sea-water intrusion, and subnormal rainfall. Mission Basin received only 80 percent of its 50-year mean precipitation during 1960 continuing an eight-year period of dry weather broken only by above-normal rainfall in the 1957-58 season.

The wells in the monitoring program are divided into two groups for studies of water quality changes. Sea-water intrusion was evident near the ocean before 1953. Ground water from well 11S/4W-13Q1, located 2.4 miles from the ocean, showed marked increases in total dissolved solids and chloride between 1959 and 1960. The absence of wells which could be sampled in the area of intrusion makes the advance of sea water difficult to follow, but the available data indicate that the intrusion has been continuous and that waters containing more than 1,000 ppm chloride advanced by 1960 to a point about 2.5 miles inland from the coast.

Analyses of ground water samples collected from three wells near the City of San Luis Rey, 11S/4W-8H1, -8J1, and -8N1, showed chloride content ranging from 422 ppm to 712 ppm in 1960 and total dissolved solids from 1,569 ppm to 1,855 ppm. These high values are attributed to degradation by inflow of connate waters from the marine sediments. Water from well -8N1 has consistently maintained a high total dissolved solids and chloride content during its seven-year period of record. Water from well 11S/4W-8H1, on the other hand, has exhibited a downward trend in total dissolved solids and chloride content since 1957. Chlorides decreased from 685 ppm in October 1957 to 422 ppm in December, 1960.

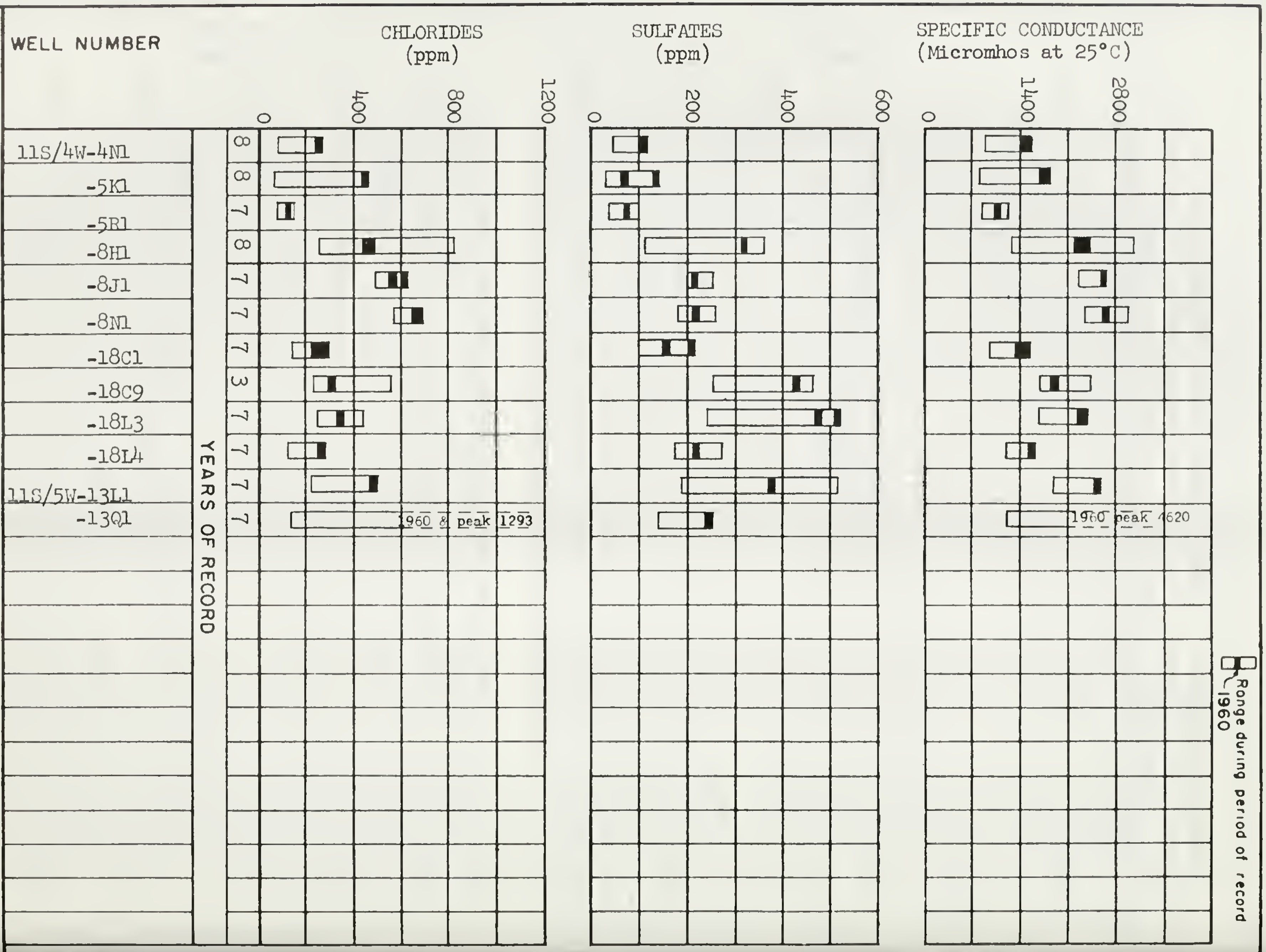
Ground water from well 11S/4W-5K1, located about one mile north of San Luis Rey, exhibited sharp fluctuations in total dissolved solids and chlorides during 1960 after a relatively stable eight-year period of record. Chloride content jumped from 104 ppm in 1959 to 420 ppm in February 1960, decreased to 165 ppm in March 1960 and then rose back up to 420 ppm in November 1960. Total dissolved solids similarly varied from values below 600 ppm in 1959 to values above 1,100 ppm in 1960.

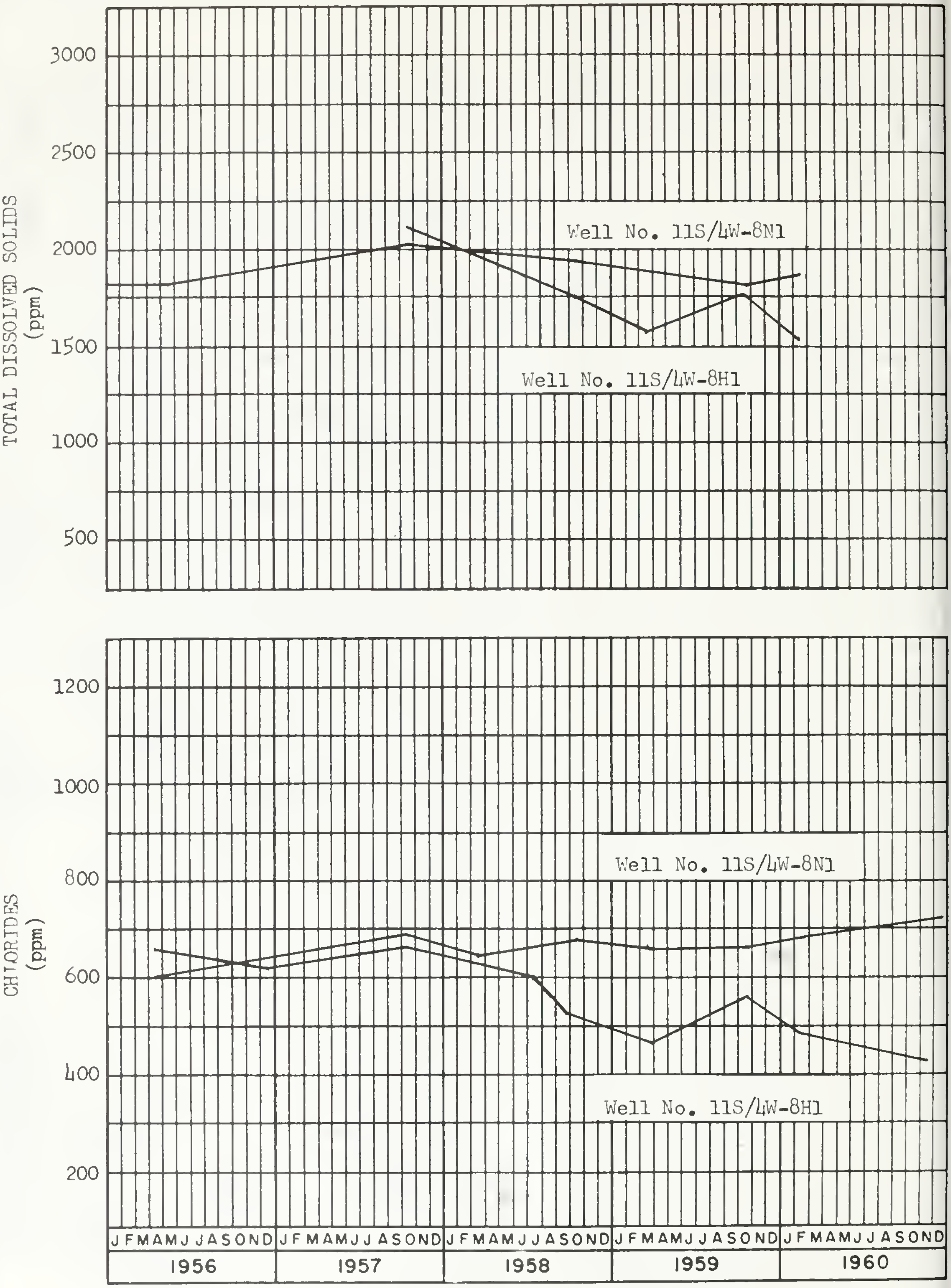
There are no wells available for ground water monitoring immediately below the sewage treatment plant effluent recharge area. No changes in ground water quality in existing wells downstream from this discharge were shown by 1960 analyses. Mineral analyses of the effluent from Whelan Lake in 1960 showed it to be inferior in mineral quality to local ground water. The 1960 data for the effluent water show the following ranges of significant constituents: total dissolved solids 1,603 to 2,296 ppm;

chloride 230 to 682 ppm; and boron 0.70 to 1.45 ppm. In 1960, the flow to the recharge area averaged about two million gallons a day.

WATER QUALITY RANGES

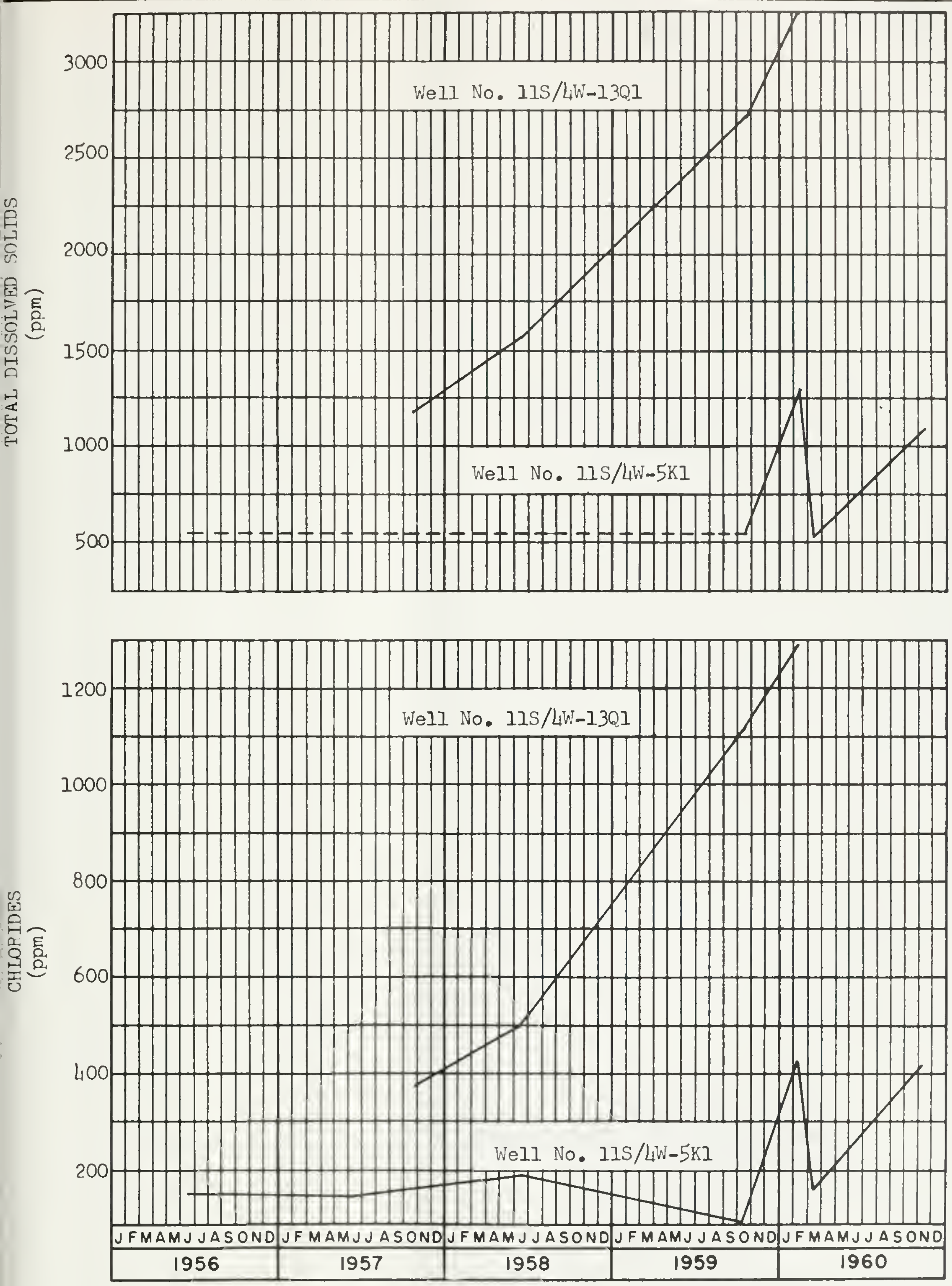
MISSION BASIN, SAN LUIS REY VALLEY





FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

MISSION BASIN, SAN LUIS REY VALLEY



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

MISSION BASIN, SAN LUIS REY VALLEY

LEGEND

BASIN BOUNDARY

13L1 MONITORED WELL

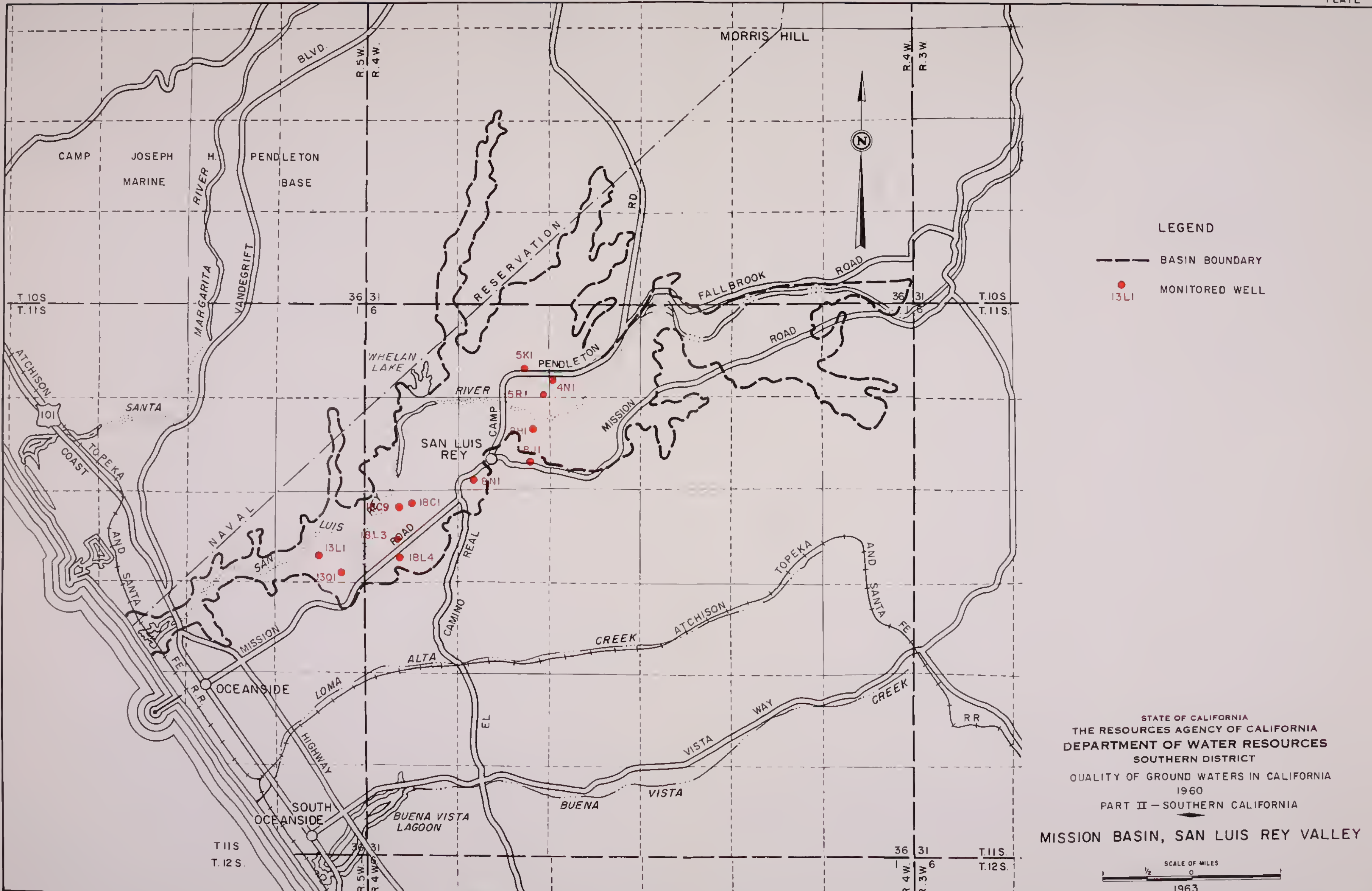
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II — SOUTHERN CALIFORNIA

SSION BASIN, SAN LUIS REY VALLEY

SCALE OF MILES
1 ½ 0 1

1963



MORRIS HILL
CAMP JOSEPH H. PENDLETON
MARINE BASE
SANTA MARGARITA RIVER
VANDEGRIFT BLVD.
NAVAL RESERVATION
WHELAN LAKE
PENDLETON RD.
FALLBROOK ROAD
MISSION ROAD
SAN LUIS REY RIVER
SAN LUIS REY
CAMP
EL CAMINO REAL
ATCHISON TOPEKA AND SANTA FE R.R.
COAST HIGHWAY
101
OCEANSIDE
SOUTH OCEANSIDE
LOMA ALTA CREEK
BUENA VISTA CREEK
VISTA WAY
BUENA VISTA LAGOON
R.R.
R.5W. R.4W.
R.4W. R.3W.
T.10S T.11S
T.11S T.12S
5K1
4N1
5R1
8H1
8J1
6N1
18C1
18C9
18L3
18L4
13L1
13Q1
LEGEND
BASIN BOUNDARY
MONITORED WELL
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA
MISSION BASIN, SAN LUIS REY VALLEY
SCALE OF MILES
1963

El Cajon Valley (9-16)

The El Cajon Valley is a small basin in San Diego County about 10 miles east of the City of San Diego; its boundaries are shown on Plate 14, "El Cajon Valley." It is about 4 miles wide and 5 miles long, and has an area of about 22 square miles. The basin is bounded by low hills, and opens into San Diego River Valley. Forester Creek, which is tributary to San Diego River, drains the basin.

Ground Water Occurrence. Ground water is obtained principally from fractured and weathered zones in crystalline rocks. The Recent alluvium, which extends throughout the basin to depths of about 50 feet in some areas, is practically devoid of water. Sediments of Tertiary age yield very little water because their permeabilities are low. Well yields range from 1 to 300 gpm.

Ground Water Development and Use. Ground water development is extensive for domestic uses and to a lesser extent for agricultural and municipal supplies. Ground water is insufficient to meet demand, and Colorado River water is imported as a supplementary supply.

Major Waste Discharges. Effluent waste waters from two sewage treatment plants constitute the major waste discharges. The effluents are used for irrigation of parks and golf courses, and overflow is discharged to Forester Creek.

Monitoring Program. The monitoring program was initiated in 1953 to detect changes in ground water quality which might occur due to waste discharges, reuse of ground water, and importation of Colorado River water. In 1960, 14 samples were collected from 7 monitored wells.

El Cajon Valley (9-16)

The El Cajon Valley is a small basin in San Diego County about 10 miles east of the City of San Diego; its boundaries are shown on Plate 14, "El Cajon Valley." It is about 4 miles wide and 5 miles long, and has an area of about 22 square miles. The basin is bounded by low hills, and opens into San Diego River Valley. Forester Creek, which is tributary to San Diego River, drains the basin.

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Monitoring Program. The monitoring program was initiated in 1953 to detect changes in ground water quality which might occur due to waste discharges, reuse of ground water, and importation of Colorado River water. In 1960, 14 samples were collected from 7 monitored wells.

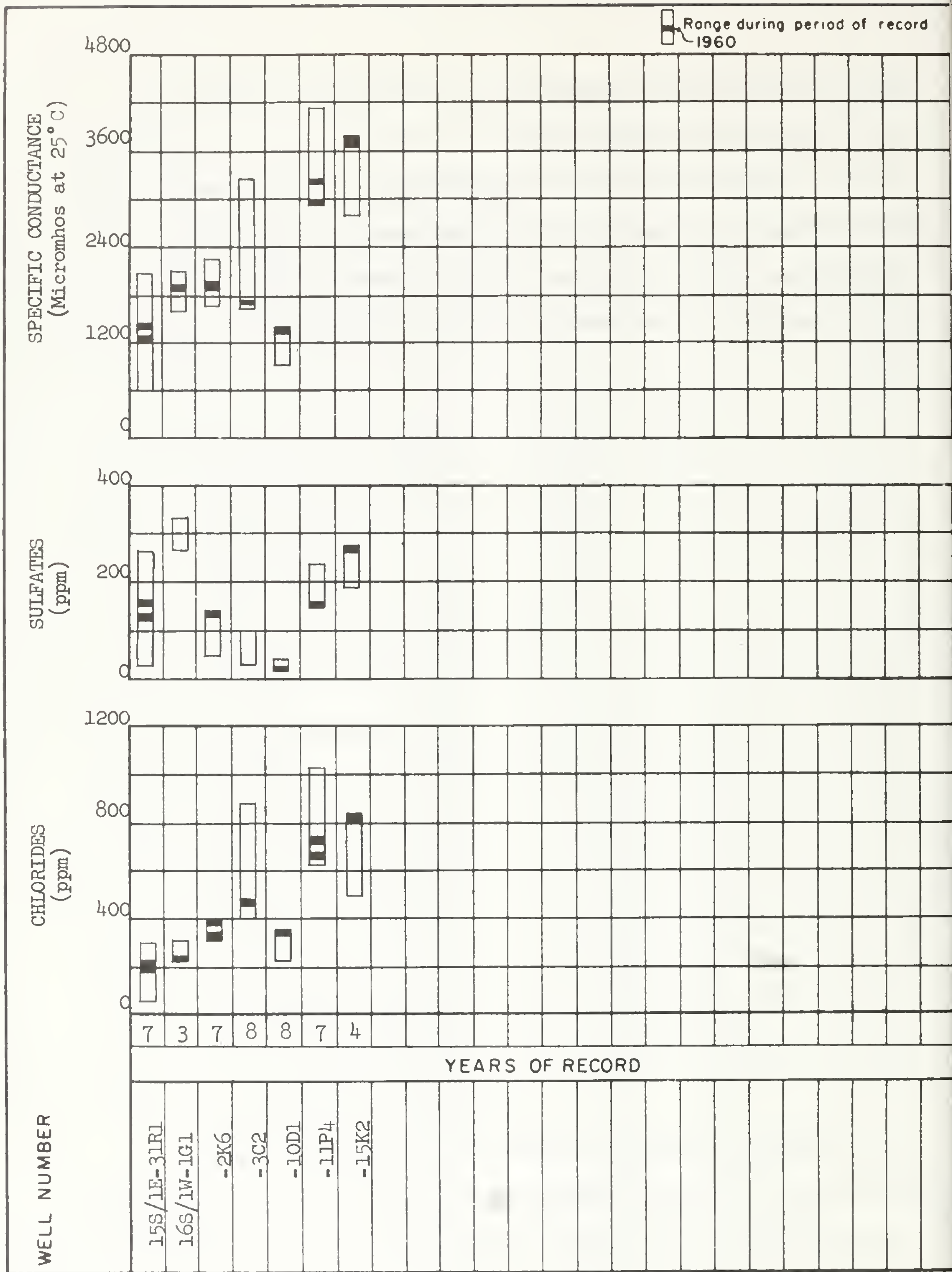
Evaluation of Water Quality. Ground water in the basin is predominantly sodium chloride or sodium-calcium chloride in character. The water is hard to very hard and high in total dissolved solids, chloride, and nitrate content. Total dissolved solids and chloride content generally exceed the accepted standards for drinking water. Analyses of ground water samples obtained in 1960 show the following ranges for significant mineral constituents:

	High	Median	Low
Total dissolved solids	2,640	1,060	710 ppm
Chlorides	852	379	191 ppm
Nitrates	171	70	10 ppm
Sulfates	274	143	42 ppm
Total hardness	828	542	247 ppm
Percent sodium	62	53	44

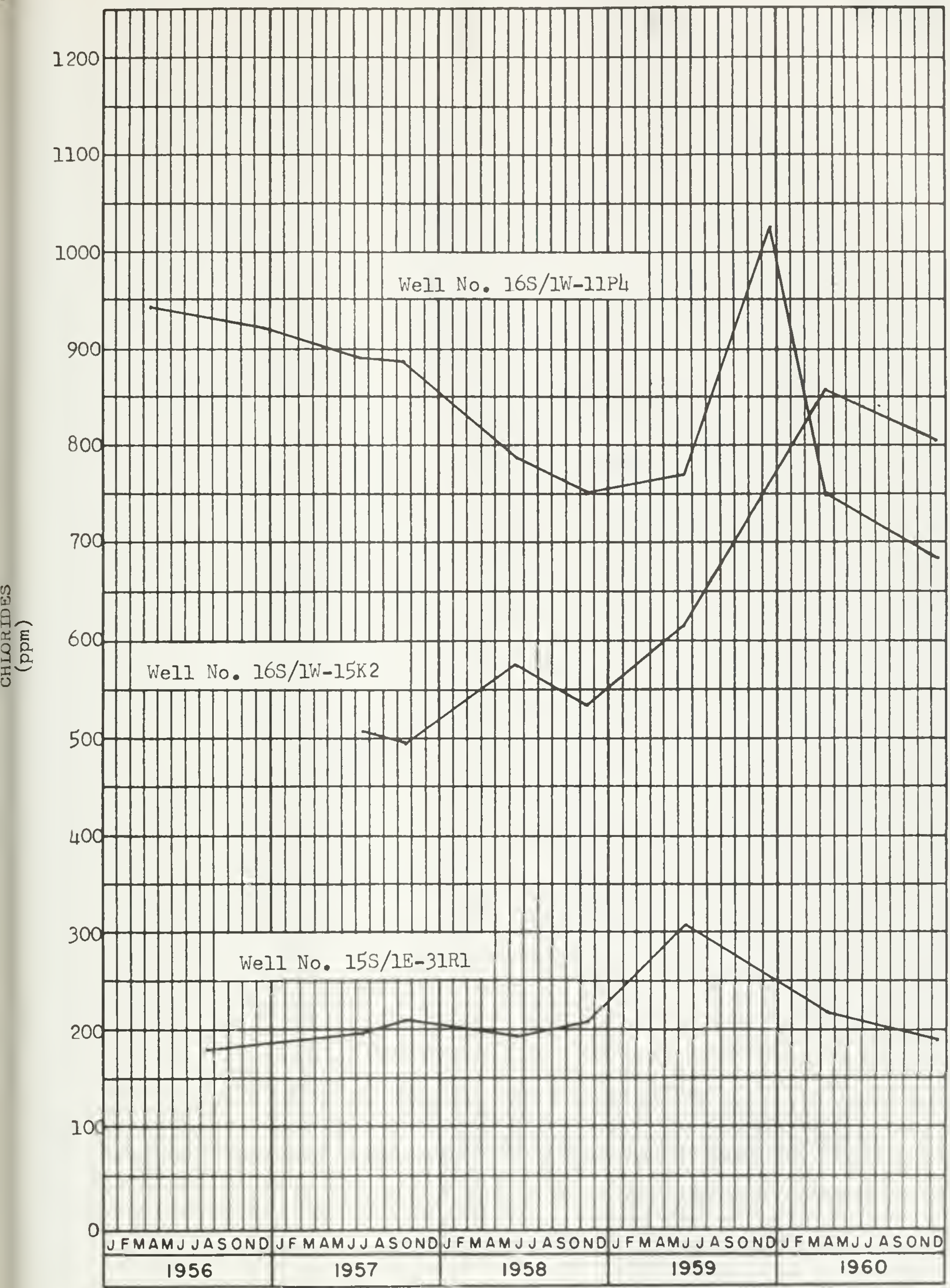
Significant Water Quality Changes. The quality of ground water in El Cajon Basin is extremely variable. No general increases in mineral concentrations were indicated by the mineral analyses of ground water samples collected in 1960. For the eight-year period of record, rapid increases in concentrations in ground water from individual wells have usually been followed by rapid decreases and in general follow no consistent pattern of change. Ground water from well 15S/1E-31R1, located approximately 1.5 miles northeast of Bostonia exhibited this fluctuation. In 1959 chloride, sulfate, total dissolved solids, and nitrate content increased sharply and then in 1960 decreased sharply back to their former levels. Chloride content is plotted as an illustration.

Ground water from well 16S/1W-11P4, located approximately one-half mile southeast of El Cajon, has decreased steadily in chloride content from 1,007 ppm in 1955 to 682 in 1960. This downward trend was broken sharply by an increase to 1,026 ppm in 1959 followed by a decrease to 750 ppm in the early part of 1960.

Ground water from well 16S/1W-15K2, located approximately one mile southwest of El Cajon, has increased steadily in chloride content from 505 ppm in 1957 to 805 ppm in December 1960. A sharp increase occurred from 1959 to 1960, bringing chloride content up to 852 ppm in April 1960.

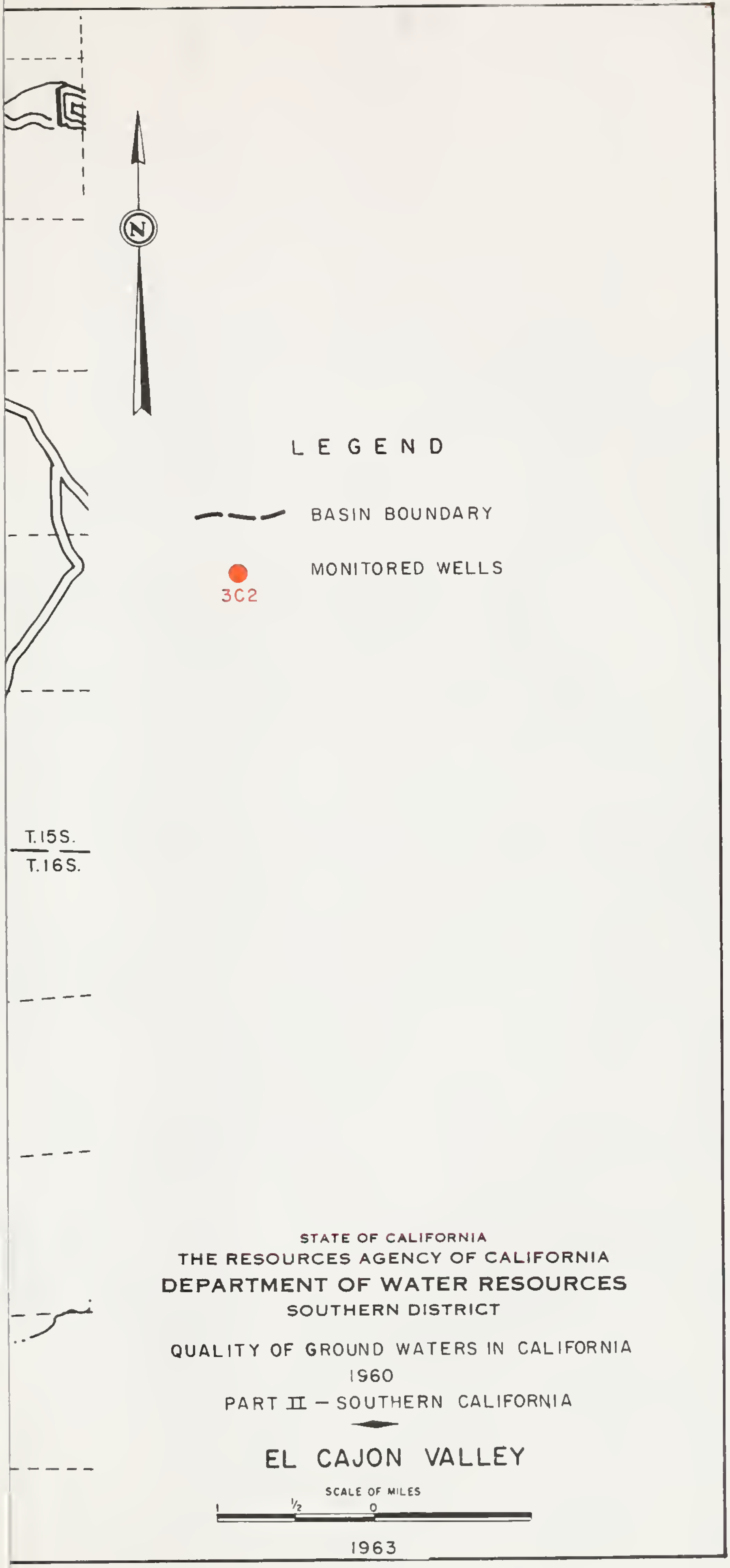


WATER QUALITY RANGES
EL CAJON VALLEY



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

EL CAJON VALLEY

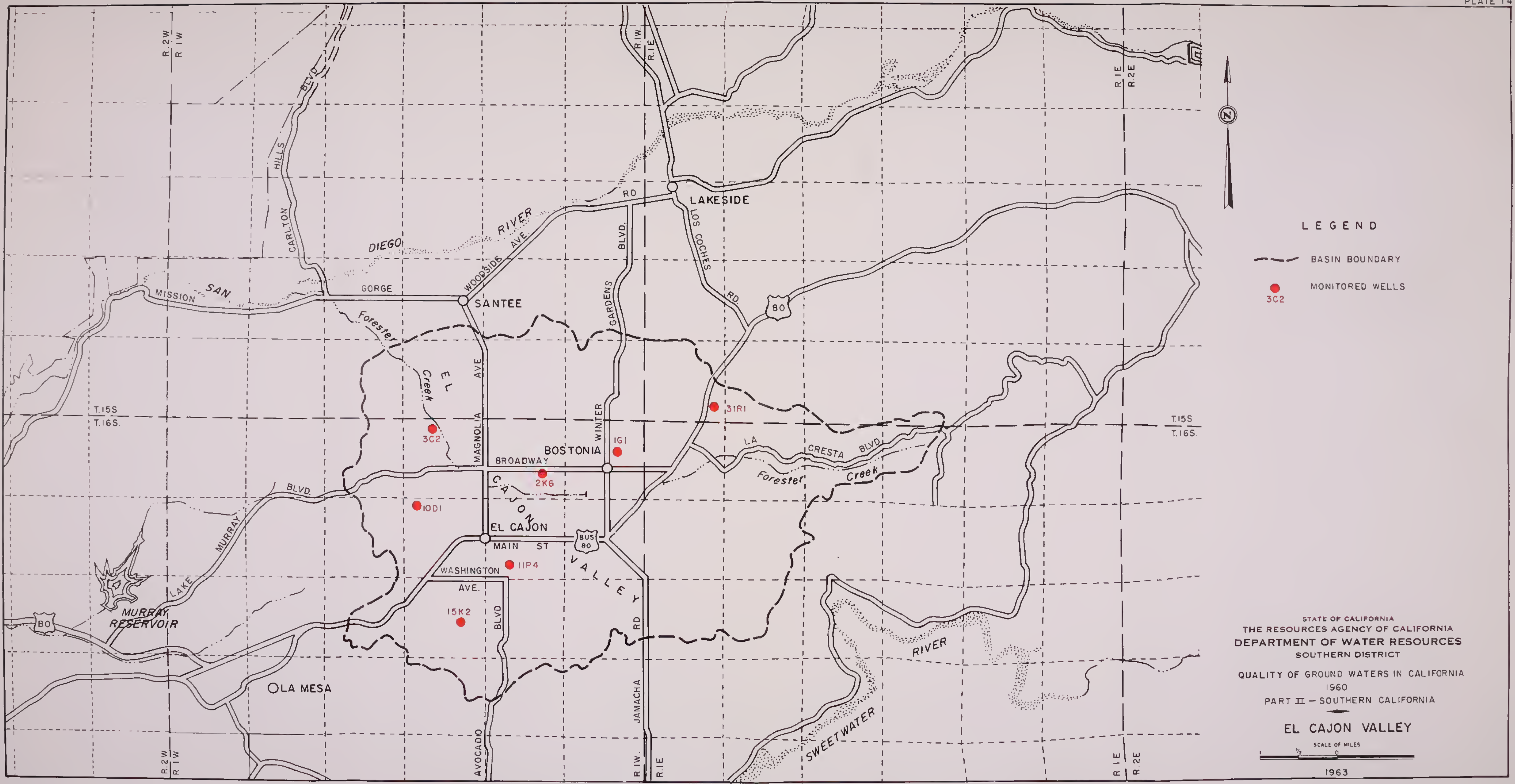


STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II — SOUTHERN CALIFORNIA

EL CAJON VALLEY

1963


LEGEND
BASIN BOUNDARY
MONITORED WELLS
3C2
LAKESIDE
SANTEE
BOSTONIA
EL CAJON
OLA MESA
MURRAY RESERVOIR
EL CAJON VALLEY
SAN DIEGO RIVER
SWEETWATER RIVER
Forester Creek
3C2
31R1
1G1
2K6
10D1
11P4
15K2
T.15S
T.16S.
R.2W R.1W
R.1W R.1E
R.1E R.2E
STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT
QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA
EL CAJON VALLEY
SCALE OF MILES
1963

Tia Juana Valley Basin (9-19)

The Tia Juana Valley Basin is located on the California-Mexico boundary. It extends from the ocean in San Diego County inland along the Tia Juana River into Mexico. In California the basin is about 5 miles in length, averages 1.5 miles in width, and has an area of about 7 square miles. The basin boundaries are shown on Plate 15, "Tia Juana Valley Basin."

Ground Water Occurrence. Ground water is found in the alluvium which underlies the Tia Juana River channel. Hydrologic observations indicate the presence of a shallow water-bearing zone overlying a deeper zone in most of the monitored area near the ocean. Both zones are composed of alluvial sediments, but the low permeability of the upper zone gives the lower zone the characteristics of a pressure aquifer. Only one zone exists in the inland portion of the monitored area. Well yields range from 60 to 1,500 gallons per minute.

Ground Water Development and Use. Ground water is extensively developed for irrigation. Lesser amounts are used for municipal and domestic needs. Ground water supplies all uses in the basin.

Storage of ground water is highly responsive to recharge conditions and use. In periods of low rainfall, use of water lowers ground water levels to below sea level and induces intrusion of sea water.

Major Waste Discharges. The major waste discharge is sewage from the City of San Ysidro. After processing at the city's sewage treatment plant, it was conveyed to the ocean by pipeline in 1960. Irrigation waste water readily percolates to the ground water body.

Tia Juana Valley Basin (9-19)

The Tia Juana Valley Basin is located on the California-Mexico boundary. It extends from the ocean in San Diego County inland along the Tia Juana River into Mexico. In California the basin is about 5 miles in length, averages 1.5 miles in width, and has an area of about 7 square miles. The basin boundaries are shown on Plate 15, "Tia Juana Valley Basin."

Ground Water Occurrence. Ground water is found in the alluvium which underlies the Tia Juana River channel. Hydrologic observations indicate the presence of a shallow water-bearing zone overlying a deeper zone in most of the monitored area near the ocean. Both zones are composed of alluvial sediments, but the low permeability of the upper zone gives the lower zone the characteristics of a pressure aquifer. Only one zone exists in the inland portion of the monitored area. Well yields range from 60 to 1,500 gallons per minute.

Ground Water Development and Use. Ground water is extensively developed for irrigation. Lesser amounts are used for municipal and domestic needs. Ground water supplies all uses in the basin.

Storage of ground water is highly responsive to recharge conditions and use. In periods of low rainfall, use of water lowers ground water levels to below sea level and induces intrusion of sea water.

Major Waste Discharges. The major waste discharge is sewage from the City of San Ysidro. After processing at the city's sewage treatment plant, it was conveyed to the ocean by pipeline in 1960. Irrigation waste water readily percolates to the ground water body.

Monitoring Program. The monitored area is the portion of the basin within California. It was included in the monitoring program in 1953 to follow the advance of salt-water intrusion noticed in coastal wells in 1947. In 1960, 16 samples were collected from 9 monitoring wells.

Evaluation of Water Quality. The ground water is sodium chloride in character and is very hard. It often exceeds the United States Public Health Service's "Recommended Maximum Limits" for drinking water in total dissolved solids, chlorides, sulfates and fluorides. It is very often class 2 irrigation water because of its high boron content. Although poor in mineral quality, it is used successfully for agricultural and domestic purposes. Degrading influences are attributed to sea-water intrusion, adverse salt balance, and inflow of connate water from older sediments.

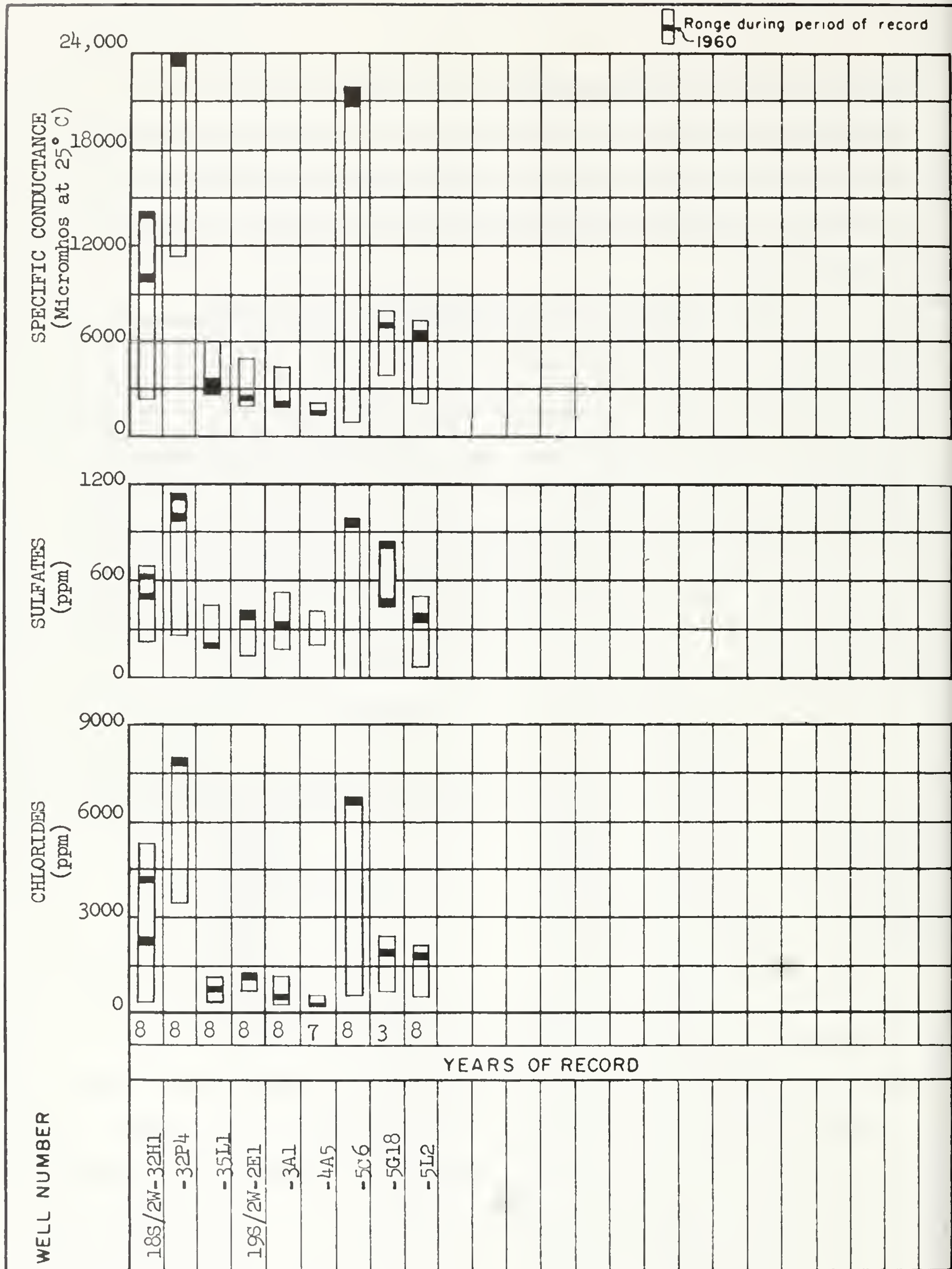
Analyses of ground water samples collected in 1960 show the following ranges for significant mineral constituents:

	High	Median	Low	
Total dissolved solids	16,320	5,390	1,740	ppm
Chlorides	7,900	1,840	402	ppm
Sulfates	1,104	506	214	ppm
Nitrates	57	9	2.5	ppm
Total hardness	4,500	1,423	491	ppm
Fluoride	1.2	0.7	0.4	ppm
Boron	1.26	0.66	0.14	ppm
Percent sodium	66	59	50	

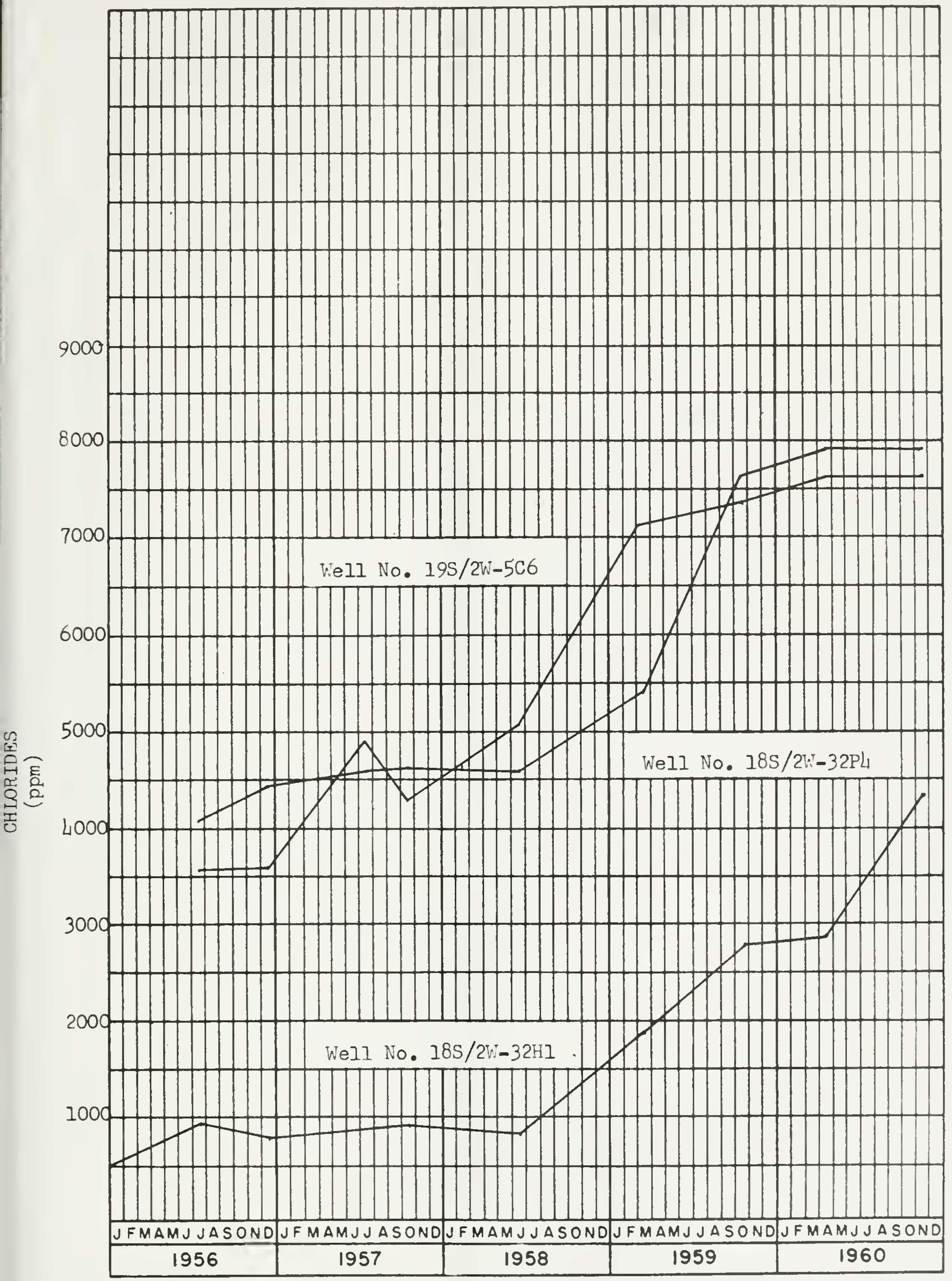
Significant Water Quality Changes. Comparison of analyses of ground water samples collected in 1960 with those of 1959 shows a general increase in total dissolved solids and chloride throughout the basin. Ground water from well 18S/2W-32P4, located about one mile inland from the coast, continued to rise in chloride content from 7,605 ppm in October 1959 to 7,890 ppm in November 1960. This represents a leveling off after the rapid rise occurring between 1958 and 1959. Ground water from well 18S/2W-32H1, located about 1.5 miles from the coast, showed an increase in chloride content from 2,730 ppm in October 1959 to 4,290 ppm in November 1960, indicating sea-water intrusion to a distance of more than 1.5 miles inland.

Ground water from wells 19S/2W-2E1 and -3A1, located about 3.5 miles from the ocean, showed chloride contents of 909 ppm and 709 ppm, respectively, in 1960. The high chlorides in these well waters are believed to be due to reuse of ground water, migration of poor quality ground water from adjacent marine sediments, or both.

Tia Juana Valley Basin received 82 percent of the 50-year mean precipitation during the 1959-60 rainfall season.



WATER QUALITY RANGES
TIA JUANA VALLEY BASIN



FLUCTUATIONS OF CONSTITUENTS IN SELECTED WELLS

TIA JUANA VALLEY BASIN

LEGEND

BASIN BOUNDARY

2E1 MONITORED WELL

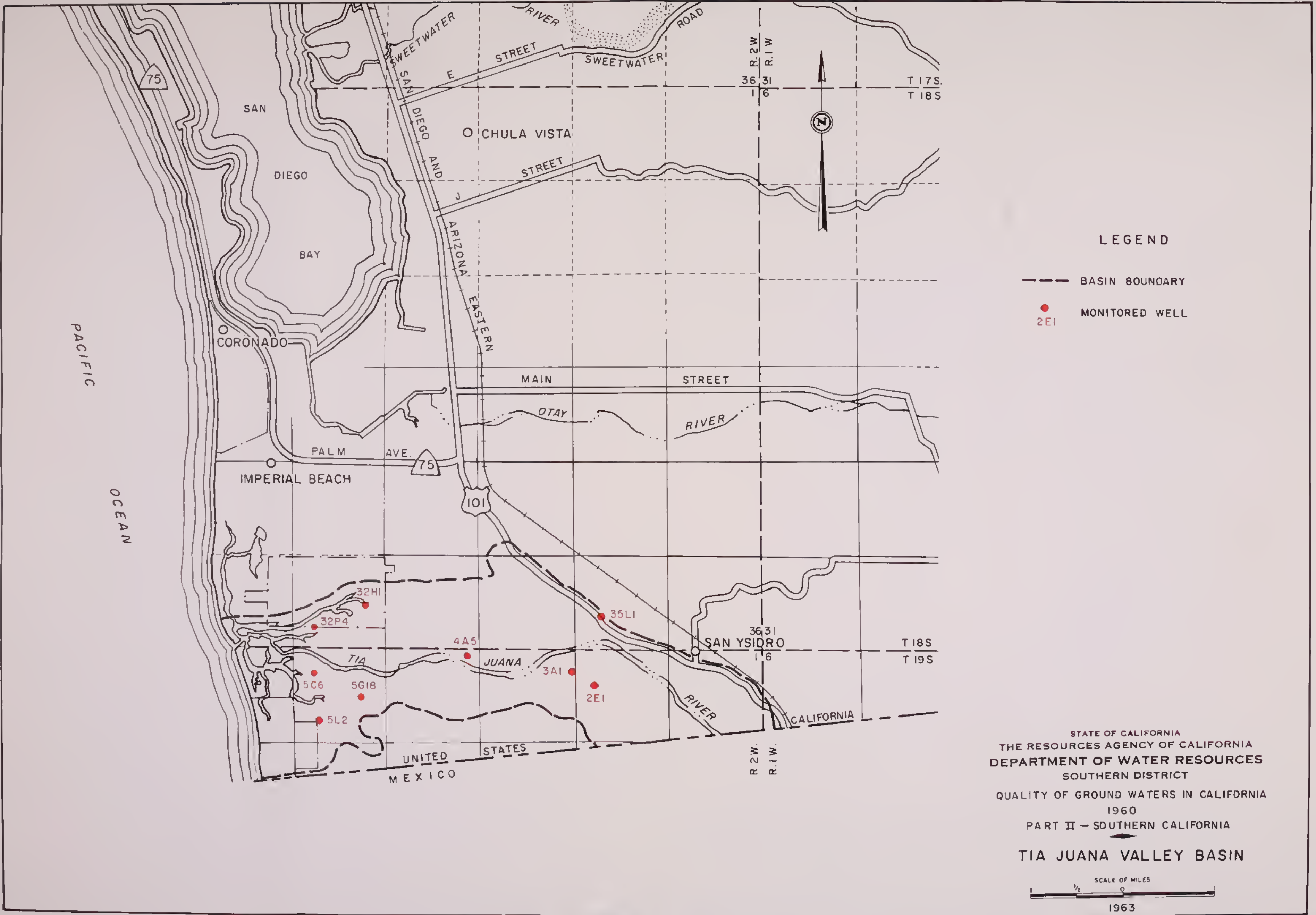
STATE OF CALIFORNIA
HE RESOURCES AGENCY OF CALIFORNIA
PARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

JALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II — SOUTHERN CALIFORNIA

TIA JUANA VALLEY BASIN

SCALE OF MILES
1 ½ 0 1

1963



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

QUALITY OF GROUND WATERS IN CALIFORNIA
1960
PART II – SOUTHERN CALIFORNIA

TIA JUANA VALLEY BASIN

1963

APPENDIX A

PROCEDURES AND CRITERIA

APPENDIX A

PROCEDURES AND CRITERIA

APPENDIX A

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Laboratory Methods and Procedures

Analytical methods used in the determination of the various constituents in the following tables conform generally to those presented in "Standard Methods for the Examination of Water, Sewage, and Industrial Wastes," a joint publication of the American Public Health Association, American Water Works Association, and the Federation of Sewage and Industrial Wastes Association, 10th edition, 1955. Analytical procedures described in "Methods of Water Analyses," United States Geological Survey, 1956, now in preparation for publication, have been used for the determination of certain specific constituents.

Table A-1 indicates the constituents analyzed in the various types of analyses performed in connection with this program.

Mineral analyses of the water samples were performed by the Department of Water Resources laboratories located in San Bernardino and Riverside, by Terminal Testing Laboratories, Incorporated, located in Los Angeles, or U.S. Agricultural Consultants and Laboratories, located in Burbank. Cooperating agencies which collected samples and analyzed them in their laboratories were Los Angeles County Flood Control District, San Bernardino County Flood Control District, Orange County Department of Agriculture, the California Department of Public Health Laboratory and the Metropolitan Water District of Southern California, located in Los Angeles. The laboratory which conducted and reported each mineral analysis is indicated in the right-hand column of the Mineral Analyses Tables. Radioactivity counting was performed by Isotopes Specialities Company, Incorporated, located in Burbank, Nuclear Consultants Corporation, located in Glendale, or the California Disaster Office Laboratory, located in Sacramento.

TABLE A-1

Types of Analysis

Constituent	Standard mineral	Partial mineral	Radiological
Specific conductance	X	X	
pH[a]	X	X	
Total dissolved solids	X		
Percent sodium	X	X	
Temperature[a]	X	X	
Calcium	X		
Magnesium	X		
Sodium	X		
Potassium	X		
Carbonate	X	X	
Bicarbonate	X	X	
Sulfate	X		
Chloride	X	X	
Nitrate	X		
Fluoride	X		
Boron	X		
Silica	X		
Total activity[b]			X

a. Field determination.
b. Total activity determination is the total alpha, beta, and gamma activity.

The methods and procedures for sample preparation and determination of radioactivity in ground water were those currently recommended by the United States Public Health Service's Robert A. Taft Sanitary Engineering Center, Cincinnate, Ohio. For uniformity of presentation of the results, they have been computed to the common basis of total radioactivity calculated as alpha plus beta plus gamma activity, less background activity. The statistical errors have been converted to one standard deviation, in micro-micro curies (2.22 counts per minute) per liter of water. The final result is expressed (symbolically) as $x \pm y$ uuc/l. This means that in a series of determinations on the same sample, the value of x should fall between $x-y$ and $x+y$.

Water Quality Criteria

Criteria used by the Department of Water Resources in the evaluation of the acceptability of water for the most common beneficial uses are described hereinafter. In general, the values presented herein should be considered only as guides to judgment, and not as absolute limiting standards.

Criteria for Drinking Water

Chapter 7 of the California Health and Safety Code contains laws and standards relating to domestic water supply. Section 4010.5 of this code refers to the drinking water standards promulgated by the United States Public Health Service for water used on interstate carriers. These criteria have been adopted by the State of California. They are set forth in detail in United States Public Health Drinking Water Standards, 1962, Public Health Service Publication No. 956.

According to Section 5 of the above-named report, chemical substances in drinking water, either natural or treated, should not exceed the concentrations shown in Table A-2.

An additional factor with which water users are concerned is hardness. Hardness is due principally to calcium and magnesium salts and is generally evidenced by inability to develop suds when using soap.

For purposes of this report the following three degrees of hardness has been used. Waters containing 100 ppm or less of hardness (As $Ca\ CO_3$) are considered "soft"; those containing 101 to 200 ppm are considered "moderately hard"; and those with more than 200 ppm are considered "very hard."

TABLE A-2

LIMITING CONCENTRATIONS OF MINERAL CONSTITUENTS FOR DRINKING WATER

United States Public Health Service Drinking Water Standards, 1962

Constituent	Parts per Million
<u>Mandatory</u>	
Arsenic (As)	0.05
Barium (Ba)	1.0
Cadmium (Cd)	0.01
Chromium (Hexavalent) (Cr+6)	0.05
Cyanide (CN)	0.2
Lead (Pb)	0.05
Selenium (Se)	0.01
Silver (Ag)	0.05
<u>Recommended but not mandatory</u>	
Alkyl benzene sulfonate (ABS)	0.5
Arsenic (As)	0.01
Chloride (Cl)	250.
Copper (Cu)	1.
Carbon chloroform extract (CCE)	0.2
Cyanide (CN)	0.01
Iron (Fe)	0.3
Manganese (Mn)	0.05
Nitrate (No_3)	45.
Phenols	0.001
Sulfate (SO_4)	250.
Total dissolved solids	500.
Zinc (Zn)	5.

Interim standards for certain mineral constituents have recently been adopted by the California State Board of Public Health. Based on these standards, temporary permits may be issued for drinking water failing to meet the United States Public Health Service Drinking Water Standards, provided the mineral constituents in the following tabulation are not exceeded.

UPPER LIMITS OF TOTAL SOLIDS AND SELECTED MINERALS IN DRINKING WATER AS DELIVERED TO THE CONSUMER

	Permit	Temporary Permit
Total solids	500 (1,000)*	1,500 ppm
Sulfates (SO_4)	250 (500)*	600 ppm
Chlorides (Cl)	250 (500)*	600 ppm
Magnesium (Mg)	125 (125)*	150 ppm

Limits may be established for other organic mineral substances if their presence in water renders it hazardous, in the judment of state or local health authorities.

The California State Board of Health has defined maximum safe amounts of fluoride ion in drinking water in relation to mean annual temperature.

Mean Annual Temperature in °F	Mean Monthly Maximum Fluoride Ion Concentration in ppm
50	1.5
60	1.0
70 - above	0.7

*Numbers in parentheses are maximum permissible, to be used only where no other more suitable waters are available in sufficient quantity for use in the system.

Criteria for Irrigation Water

Because of the diverse climatological conditions, crops, soils, and irrigation practices in California, criteria which may be set up to evaluate the suitability of water for irrigation use must necessarily be of a general nature, and judgment must be used in their application to individual cases. Suggested limiting values for total dissolved solids, chloride concentration, percent sodium and boron concentration for three general classes of irrigation water are shown in Table A-3.

Criteria for Industrial Water

The water quality criteria for the diversified uses of water in industry range from the exacting requirements for make-up water for high pressure boilers to the minimum requirements for water washdown and metallurgical processing.

Because of the large number of industrial uses of water and widely varied quality requirements, it is practicable to suggest only very broad criteria of quality. These variable conditions make it desirable to consider water quality requirements in broad and general terms only, and, where possible, for groups of related industries rather than individually.

TABLE A-3

QUALITATIVE CLASSIFICATION OF IRRIGATION WATERS

Chemical properties	Class 1 Excellent to good (Suitable for most plants under any conditions of soil and climate)	Class 2 Good to injurious (Possible harmful for some crops under certain soil conditions)	Class 3 Injurious to unsatisfactory (Harmful to most crops and unsatisfactory for all but the most tolerant)
Total dissolved solids			
In ppm	Less than 700	700-2,000	More than 2,000
In conductance, $ECx10^6$	Less than 1,000	1,000-3,000	More than 3,000
Chloride ion concentration			
in milliequivalents per liter	Less than 5	5- 10	More than 10
in ppm	Less than 175	175- 350	More than 350
Sodium in percent of base constituents	Less than 60	60- 75	More than 75
Boron in ppm	Less than 0.5	0.5- 2.0	More than 2.0

APPENDIX B

WELL DATA, ANALYSES OF GROUND WATER

AND

RADIOASSAY OF GROUND WATER, 1960

APPENDIX B

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WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available		
									Log	Water levels	Analyses
		SANTA MARIA RIVER VALLEY (3-12)									
9N/32W-17G1	2 miles east of Sisquoc 0.15 mile north of Highway 148	E. C. Lyman	1929	Dom. Obs.	447	6	107		Yes	Yes	Yes
9N/33W-8K1	0.5 mile north of Clark Avenue 1.35 miles east of Highway 101	Lake Marie Farms		Dom.	697	6-4	665		Yes		Yes
9N/33W-9A1	0.1 mile west of Bradley Road 0.15 mile south of Gary Road	W. E. Houke Estate		Dom.		10	220			Yes	Yes
9N/33W-12R1	0.1 mile west of Highway 140; behind Blockman School in Sisquoc	Blockman School	12-1950	Sch.		8	312	201-209, 214-222 229-251, 256-286	Yes		Yes
9N/34W-9E1	1.0 mile west of Blosser Road 50 feet south of Highway 1	Mattia Bognuda		Irr.		14	377				Yes
10N/34W-6N1	1.0 mile north of Intersection Bonita School Road and Main Street	Grisingher and Signorelli	5-1924	Irr.	152	16	190	50-79, 82-100 117-130, 135-189	Yes	Yes	Yes
10N/34W-16R1	0.15 mile north of Stowell Road 40 feet west of Blosser Road	J. J. O'Leary		Dom. Irr.	204	16	200	99-104	Yes	Yes	Yes
10N/34W-19H1	50 feet north of Santa Marie Valley Railroad 50 feet west of Black Road	Tenant: E. H. Moore	1928	Irr.	173	16	262		Yes		Yes
10N/34W-28A1	400 feet north of Betteravia Road 35 feet west of Blosser	George Pertusi	1938	Irr. Ind.	226		235	142-155, 170-180 190-218	Yes		Yes
10N/35W-5J1	0.45 mile west of Highway 1 0.5 mile south of Private Road	Union Sugar Company	2-1925	Dom. Irr.	79	16	291	137-144, 176-188 225-230, 250-280		Yes	Yes
10N/35W-7F1	2 miles west of Highway 1 185 feet north of West Main Street	M. J. Ellis	1928	Dom. Irr.	48	12	249	140-145, 200-225	Yes	Yes	Yes
10N/35W-9F1	0.4 mile north of Highway 166 500 feet east of Obispo Street	Waller Flower-Seed Company		Irr. Dom.	88	12	198	110-119, 152-195		Yes	Yes
10N/35W-21C1	0.5 mile north of Brown Road 50 feet south of Highway 1	Mary Donovan		Irr.	93	12				Yes	Yes
10N/36W-12R1	2.7 miles west of Highway 1 1500 feet south of West Main Street	Avilina Morgante	11-1930	Irr.	33	12	214	177-210	Yes		Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Water levels	Analyses
		SANTA MARIA RIVER VALLEY (continued)									
11N/34W-19Q1	2.8 miles southwest of Nipomo 30 feet west of Nipomo Mesa Road	Frank Silva	1941	Dom. Irr.	303	8	315		Yes	Yes	Yes
11N/34W-29P2	4.5 miles west of Santa Maria Post Office 1.75 mile east of Bonita School Road	Union Sugar Company	8-1941	Dom. Irr.	159	16	201	124-136, 158-165 165-176, 176-190	Yes		Yes
11N/35W-18M1	1500 feet west of Oso Flaco Road, near lake 3 miles west of Highway 1	Union Sugar Company		Dom.	45	6	200				Yes
11N/35W-28B1	3.41 miles north of Guadalupe Post Office Northwest corner of intersection	Union Sugar Company	1924	Irr.	70	12	465		Yes	Yes	Yes
11N/35W-33F1	1.67 mile north of Guadalupe Post Office West of Highway 1 in pumphouse	Union Sugar Company	7-1932	Irr.	84	16	234	118-150, 154-170 174-208	Yes	Yes	Yes
11N/36W-13R1	3.0 miles west of Highway 1 on road to Oso Flaco Lake, 0.2 mile south of Road	Mary B. Enos		Dom.	15	6					Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).

b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
		CUYAMA RIVER VALLEY (3-13)									
7N/24W-13C2	370 feet southwest of Highway 399-Windmill	Apache School	1949	Dom.	3,418	8	165			Yes	Yes
9N/24W-19F1	400 feet west of Highway 399-at Cuyama Forest Ranger Station in white pump house	U.S. Government (Forest Service)	Unknown	Dom.	2,760	10	113	85-113		Yes	Yes
10N/25W-20H1	50 feet north of Highway 166 1.5 mile east of Cyama River Bridge	H. S. Russel		Irr. Dom.	2,335	16	656	108-656	Yes		Yes
10N/25W-21G1	50 feet north of Highway 166, 2.2 miles east of Cuyama River Bridge	E. H. Mettler and Sons	1946	Irr.	2,357	16-10	657	108-348, 354-655	Yes	Yes	Yes
10N/25W-22E1	40 feet north of Highway 166 2.7 miles east of Cuyama River Bridge	E. H. Mettler and Sons	1946	Irr. Dom.	2,368	16-10	659	108-402, 408-655	Yes	Yes	Yes
10N/25W-23E1	500 feet north of Highway 166 4.0 miles east of Cuyama River Bridge	E. H. Mettler and Sons		Dom. Irr.	2,397	16-12-10	810	175-810			Yes
10N/25W-32H1	1.35 mile south of Highway 166 and Cuyama River Bridge and 1.5 mile east and 0.25 mile south	Pam Barkley	1950	Irr.	2,410	16	400			Yes	Yes
10N/26W-4R1	3.15 miles northwest of Cuyama Post Office North well of 2 wells, north of river and west of two houses	Hubert Russel		Dom. Irr.	2,110					Yes	Yes
10N/26W-14C1 14C2 14C3	Three springs combined flow 1.45 mile northwest of Cuyama Post Office and 1 mile north of Highway 166	Cuyama Ranch		Stock	2,180			Spring			Yes
10N/26W-14C4	1.45 mile northwest of Cuyama Post Office 1.8 mile east of Cuyama Ranch Headquarters	H. Russel	1949	Irr.	2,175	10	110	36-110	Yes		Yes
10N/26W-21Q2	2.50 miles west-southwest of Cuyama Post Office Well is west of dwelling and Well Q1	Stanley Germain	6-12-43	Dom. Irr.	2,295	16	993	144-809	Yes	Yes	Yes
10N/26W-23P1	0.5 mile west of Cuyama 0.7 mile south of Highway 166	Goehring Brothers		Dom. Irr.	2,280	16	371	82-268, 274-371	Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Water levels	Analyses
		OXNARD PLAIN PRESSURE AREA (4-4.01)									
1N/21W-30A1 11-W-17	0.33 mi. W/o Highway 101 along Hueneme Rd. 200' S/o Hueneme Rd. behind Garage	Ed Murhardt	4-1931	Irr. Dom.		14	591	387-407; 421-434; 498-512; 532-587	Yes	Yes	Yes
1N/21W-31A1 11-W-27	1.1 mi. S/o Hueneme Road, 0.38 mi. W/o U. S. 101 along Hueneme Road	Point Mugu Game Reserve	1-6-51	Irr.		12	234	190-230	Yes		Yes
1N/22W-3F4 9-U-9	0.1 mi. E/o Saviers Road (Highway 101A) 100' N/o 3rd Street	City Oxnard	1912	Mun.	54	10	232	141-232		Yes	Yes
1N/22W-7D1 7-U-2	0.8 mi. W/o West Road 400' S/o Wooley Road	D. McGrath Estate Co.		Dom. Stk	13					Yes	Yes
1N/22W-8K3 8-U-19	150' S/o Howe Road and 25' W/o Patterson Road	Alvgrez	12-15-45	Irr.		16	240	111-228	Yes		Yes
1N/22W-15B3 #7	130' N/o Dempsey Road, 150' W/o Ventura RR tracks measured along Dempsey Street	City of Oxnard	3-1954	Mun.	38	16	240	137-155; 175-195; 206-217	Yes	Yes	Yes
1N/22W-17J2	0.25 mile E/o Patterson Road 0.51 mile S/o Oxnard Road	U. S. Navy Port Hueneme		Dom.		12	242	150-190; 196-237		Yes	Yes
1N/22W-18E1 8-V-12	0.36 mi. S/o Orchard Road. 75' E/o Ocean Drive; 80' S/o LaCrescenta Street	Hollywood Beach Resort		Dom.			235	196-210		Yes	Yes
1N/22W-19R3 8-V-26	80' E/o Roosevelt Boulevard 20' N/o Lakeshore Street	Hollywood-By-The-Sea Mutual Water Co.	2-11-54	Mun.	12	10	482	198-204; 232-240; 290-310	Yes	Yes	Yes
1N/22W-19H1 8-V-15	120' SE/o Ocean Drive and 35' S/o Tujunga Avenue	Silver Strand Water Co.	5-19-47	Dom.		12	248	210-238	Yes	Yes	Yes
1N/22W-20E1	At end of Highland Drive Silver Strand 50' S/o Highland Drive 100' W/O Palms Drive	Silver Strand Mutual Water Co.	9-1950	Dom.		12	242	208-220; 226-234			Yes
1N/22W-20E2 8-V-27	15' S/o Highland Drive; 80' W/o South end of Panama Drive	Silver Strand Mutual Water Co.	3-29-55	Mun.	11		1014	940-974	Yes	Yes	Yes
1N/22W-20R1	475' W/c Pacific Street, 100' S/o Pearl Street, 50' SW/o Shipside Road	U. S. Navy		Obs.	12	12	225			Yes	Yes
1N/22W-21L1 9-V-15	200' N/o Clara Street Produced 60' E/o 5th Street	City of Port Hueneme	1944	Stand-by			272	163-260	Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
		OXNARD PLAIN PRESSURE AREA (continued)									
1N/22W-21L2	100' S/o 9V15 which is 200' N/o intersection of 5th and Clara Streets, 60' E/o & 5th Street	City of Port Hueneme	4-30-52	Mun.		24-16	500	163-260; 274-294	Yes	Yes	Yes
1N/22W-23C1 10-V-13	0.3 mi. SW/o Pleasant Valley Road from Etting Road; 100' SE/o Pleasant Valley Road in farmyard	K. L. Varnall	1938	Dom. Irr.	26	4	230			Yes	Yes
1N/22W-26A1 10-W-10	20' S/o Hueneme Road & 500' W/o Casper Road	S. A. Pidduck	5-1924	Irr. Dom.		12	236	188-229	Yes	Yes	Yes
1N/22W-28A2 9-V-41	80' E/o Perkins Road, 20' S/o Hueneme Road	R. L. Williams	1949	Dom. Irr.		14				Yes	Yes
1N/22W-2[illegible]H2	50' E/o Perkins Road, 1750' S/o Hueneme Road	Kalof Pulp & Paper Co.	7-1-52	Ind. Dom.		10	175	135-170	Yes		Yes
1N/22W-36K1	200' S/o E-W Casper Road 0.65 mi. E/o N-S Casper Road	Ventura County Game Preserve	10-9-46	Dom. Irr.		12	186	150-168		Yes	Yes
1N/22W-36K3	0.25 mi. S/o E-W Casper Road 0.45 mi. E/o N-S Casper Road produced	Ventura County Game Preserve	11-28-45	Ponds		14	335	155-170; 189-210	Yes	Yes	Yes
2N/22W-27M2	200' W/o Highway 101 AH and 0.1 mi. S/o Vineyard Avenue	Brightview Motel	8-18-47	Dom.		12	225	180-210	Yes	Yes	Yes
2N/23W-25Q1	2.9 mi. N/o Ventura Road and 0.15 mi. N/o Gonzales Road (3.95 mi. W/o U.W. 101)	Frank McGrath Estate	5-28-47	Dom.	20	10	232	190-220	Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Water levels	Analyses
	WEST COAST BASIN; SANTA MONICA BAY AREA (4-11.02)										
2S/15W-34K1 1264	East of Playa Del Rey 740 feet southwest of Pershing Drive 80 feet northwest of Sandpiper Street 20 feet southwest of 1264A	Dept. Water & Power	9-1924		82	16	208	97-133	Yes	Yes	Yes
3S/14W-7K2 1317A	60 feet west of Duley Road and 2145 feet north of El Segundo Boulevard	Standard Oil Co.	3-1949	Ind.	97	16	500	304-326, 350-368 376-410, 418-420	Yes	Yes	Yes
3S/14W-29M1 722C	65 feet north of Vorhees Avenue 100 feet west of Blossom Street	California Water Service Co.	7-1937	Mun.	114	16	474	210-223, 346-360	Yes	Yes	Yes
3S/14W-30G1 711G	200 feet east of Redondo Avenue 75 feet north of 5th Street	City of Manhattan Beach	3-2-49	Mun.	128.4		500			Yes	Yes
3S/14W-30H2 721K	50 feet west of Aviation Boulevard 50 feet south of 6th Avenue	City of Manhattan Beach	2-1949	Mun.	126		600			Yes	Yes
3S/14W-31A3 712B	80 feet east of Pier Avenue 450 feet south of Redondo Boulevard	California Water Service Co.	1908	Obs.	92	12	340		Yes	Yes	Yes
3S/14W-32F1 723	40 feet north of Harriman Lane, 145 feet west of Ringde Avenue; Redondo Beach	Alvin A. Selleck	Prior to 1930	Not used	148	12	551			Yes	Yes
3S/15W-3A1 Test Hole A #1265	0.8 mile northwest of Imperial Highway, 0.3 mile southwest of Int. of Century Boulevard and Pershin Drive; Playa Del Rey	L. A. Co. F. C. D.	12-14-51	Test	70	8	259		Yes	Yes	Yes
3S/15W-11M5 1277F	Southeast corner of I & 11th Street Hyperion Sewage Plant, El Segundo	L. A. Co. F. C. D.	6-10-55	Obs.	30	8	150		Yes	Yes	Yes
3S/15W-12H2 1307E	50 feet north of Palm Avenue, 150 feet east of Washington Avenue	City of El Segundo	3-6-47	Mun.	135	16	380	202-229	Yes	Yes	Yes
3S/15W-12H3 1307D	250 feet north of Palm Avenue 150 feet east of Washington Avenue	City of El Segundo	3-14-47	Mun.	130		384		Yes	Yes	Yes
3S/15W-13R2 1309E	176 feet west of Sepulveda Boulevard 400 feet north of Rosecrans Avenue	Standard Oil Co.	8-1941	Ind.	153	16	480		Yes	Yes	Yes
3S/15W-13R6 1309M	755 feet west of Sepulveda Boulevard 80 feet north of Rosecrans Avenue	Standard Oil Co.		Ind.	150	16	495	276-325, 380-392	Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).

b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available		
									Log	Water levels	Analyses
	WEST COAST BASIN; SANTA MONICA BAY AREA (continued)										
3S/15W-25A3 701D	250 feet west of Sepulveda Boulevard 100 feet north of 8th Street, north side of plant	City of Manhattan Beach	6-1936	Mun.	156	16	350		Yes	Yes	Yes
4S/14W-17F1 727H	1,391 feet east of ℄ of Tulita Avenue; 62 feet south of ℄ of Sepulveda Boulevard, 9 feet west of well "17F2"	L. A. Co. F. C. D.	6-20-58	Test	181	2	675	580-590; Grout Plug 486-496; Outside Casing	Yes	Yes	Yes
4S/14W-17H2 737C	120 feet north of Sepulveda Boulevard; 300 feet west of Valeric Street; 1.17 miles east of Juanita along Sepulveda	Del Amo Estates Co.	4-1947	Mun.	92	30-16	456	192-456	Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
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WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
		WEST COAST BASIN HAWTHORNE-GARDENA AREA (4-11.02)									
3S/13W-29G3	125 feet north of 165th Street 660 feet east of Avalon Boulevard	Henry Ishida 653 E. 165th St.	1-25-28	Dom. Irr.	61	8	235	Gardena Zone	Yes		Yes
3S/13W-31F1	0.34 miles west of Figueroa 150 feet north of 184th Street	Mrs. Distel 685 W. 184th St.	1936	Dom.	27	6	159			Yes	
3S/14W-22R2	200 feet east of Lemoli Avenue 110 feet south of 154th Place, Gardena	Park Water Co. 4206 E. Rosecrans Avenue, Compton	11-1942	Dom.	52	14	227	186-214	Yes	Yes	Yes
3S/14W-24A1	700 feet south of Rosecrans. and 230 feet west of Vermont Avenue	J. Scander 14507 S. Vermont Avenue	1936	Irr.			216				Yes
3S/14W-25K4	200 feet east of Normandie Avenue 0.14 miles south of 168th Street	Wilbur Hornstra	1901	Dom.	34	7	180		Yes	Yes	Yes
3S/14W-27C1	220 feet south of Manhattan Beach Boulevard 320 feet west of Bridge over Nigger Slough 780 feet west of Cerise Avenue	Los Angeles County Park Department	7-7-37	Irr.	45	14	448			Yes	Yes
3S/14W-35M5	0.3 miles west of Arlington 65 feet south of 182nd Street	Moneta Water Co.		Mun.	62	16-14	435		Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
	WEST COAST BASIN; TORRANCE AREA (4-11.02)										
4S/13W- 6Q1	115' west of Main Street, 500' south of Int. Moneta and Main	Mr. George Branning 19825 Main Street	Prior to 1934	Dom.	22.5	5	60			Yes	Yes
4S/14W- 9Q1 746	750' east of Hawthorne Boulevard 950' south of Torrance	Chanslor-Canfield Midway Oil Company	10-31-23	Ind.	106	12	557	400'		Yes	Yes
4S/14W-16L2 747D	200' east of Ocean Avenue 725' south of Sepulveda Boulevard	City of Torrance	1936	Mun.	75	12	492	195-380 450-474	Yes	Yes	Yes
4S/14W-22Q1 769	0.4 mile west of Pennsylvania Avenue 100' south of Lomita Boulevard	Union Oil Company of California	11-14-29	Ind.	77	14	660	188-197 270-300	Yes	Yes	Yes
4S/14W-35E1 271A	1650' south of Pacific Coast Highway 18' west of Pennsylvania	Attn: W.J. Robbins Edw. Sidabotham & Son, 751 E. "L" St.	1-11-26	Ind.	200	12	585	280-305 450-475 482-502	Yes	Yes	Yes
4S/14W-35F2 281C	0.46 mile south of Pacific Coast Highway 200' west of Narbonne Avenue	Chandler Sand and Gravel	12-10-51	Ind.	200	16	695		Yes	Yes	Yes
4S/14W-36H1 301	200' north of Anaheim; 300' east of P.E. Railway West of Wilmington and 200' west of well 30C1	Palos Verdes Water Co., 78 Malago Ave., Palos Verdes	7-1923	Mun.	44	12-10	610	208-214 322-610	Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
		CENTRAL BASIN PRESSURE AREA (4-11.03)									
3S/13W-2B1 1495B	35 feet north of Michigan Avenue and 100 feet west of Elizabeth Avenue	City of Southgate	--	Mun.	100	12	700	--		Yes	Yes
		LOS ANGELES FOREBAY AREA (4-11.04)									
2S/13W-10P4 2769G	200 feet west of Santa Fe; 25 feet west of northwest corner of reservoir near Pacific Street	City of Vernon	9-37	Mun.	206	18	1330	1057-1101	Yes	Yes	Yes
2S/13W-12K1 Owners #3	At rear of Hobart Ice Plant west of intersection of 26th Street and Indiana Street..	A.T. & S.F. R.R.	8-8-52	Ind.	179	16	1540	--	Yes	--	Yes
2S/13W-15N3	200 feet east of Alameda Street; and 40 feet north of 57th Street.	Pioneer Paper Co.	2-5-24	Dom. Irr. Ind.	--	16	535	--	Yes	--	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available		
									Log	Water levels	Analyses
		MAIN SAN GABRIEL BASIN (4-13.01)									
1S/10W-7A1 4239A	400' S/o Bonita Ave. & 50' W/o No. Main Ave.	Baldwin Park County Water Dist.	1910	Dom. Irr.	423	16	526		Yes	Yes	Yes
1S/10W-10C1 4289	0.88 mi. E/o Irwindale Ave. 350' S/o Arrow Hwy	City of Glendora	1920	Mun. Irr.	471	26	361		Yes	Yes	Yes
1S/10W-19N1 3023M	0.25 mi. SW'ly along Virginia Ave. from intersection with Garvey Ave. and 0.05 mi. SE/o El Monte	Walnut Place Mutual Water Co.	10-14-50	Dom.		12	150	100-136, 140-148	Yes		Yes
1S/11W-2G1 4198	40C' E/o Peck Rd. & 200' N/o road along ranch line, 0.5 mi. N/o Live Oak Ave., 75' N/o Jeffries Ave.; S/o Monrovia	City of Monrovia	May 24	Mun.	368	26	440	73-132, 136-180, 182-214, 217-350, 374-420	Yes	Yes	Yes
1S/11W-10F1	850' E/o Tyler Ave. at end of Farna St.	Southern California Water Company	4-27-51	Mun.	327	18	540		Yes	Yes	Yes
1S/11W-14M1	0.52 mi. S/o Cogswell Ave. from intersection with San Bernardino Rd., 0.06 mi. W., N/o Killion St.	Herbert Mutual Water Co.	1-9-51	Dom.		12	199		Yes		Yes
1S/11W-26K1	Well in line with East end of Valley Blvd. over San Gabriel River, 0.1 mi. N/o Valley Blvd.	San Gabriel Valley Water Co.	5-25-51	Mun. Ind.		20	312	110-152, 173-180, 194-205, 235-245 276-299	Yes		Yes
1S/11W-32C1	0.3 mi. S. & 0.03 mi. W/o intersection of Rush St. & Potrero Ave.	Pedro Mireles		Dom. Irr.		10	102	73-97	Yes		Yes
1S/11W-33P1	55' S/o Durfee Rd. & 0.46 Mi. SW/o Slack Ave., S/o El Monte	Ed Alluis		Dom. Irr.	230	7	50	40-46	Yes	Yes	Yes

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b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA
1960

State well number and other number	Location	Owner	Date completed	Use[a]	Ground surface elevation[b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
	LOWER MOJAVE RIVER VALLEY - BARSTOW TO YERMO (6-40)										
9N/1E-1M1	0.2 mile west of railroad station 0.1 mile south of Highway 91, Yermo	Union Pacific Railroad	1-19-31	Mun. Ind.		18	600	97-130, 261-274 565-583	Yes	Yes	Yes
9N/1E-15N2	1 mile northeast of Daggett, 2000' north of S.F.R.R. and 1500' east of U.P.R.R.	Grey Phelps Cool Water Ranch		Dom. Irr.					Yes		Yes
9N/2E-8N2	2.3 miles north of Highway 66, 0.8 mile up dirt road from pole line road.	Stuart C. Slack	1948	Dom. Irr.		14	300			Yes	Yes
9N/1W-5J3	0.4 mile north of U.S. 66 and Riverside Drive Int. 330 feet south of Riverside Drive	Southern California Water Company	7-19-55	Mun.		8	222	70-222	Yes		Yes
9N/1W-9G1	2.3 miles east of Barstow, 200 feet north of Highway 66, west side of Food Town Market, 0.75 mile east of Riverside Drive	V. B. Price	5-1948	Dom.		8	62			Yes	Yes
9N/1W-10D2	4 miles east of Barstow, 1.5 mile southeast of Highway 91 along Soapmine Road, 0.4 mile south of Soapmine Road on east side of road.	EBCO Consumers Oil Company	9-1944	Dom Irr. Stock	2049	12	132			Yes	Yes
9N/1W-10G1	2 miles east of Barstow, 0.5 mile south of Soapmine Road on Marks Road, 0.25 mile east of Marks Road, 150 feet south of entrance on dirt road.	Lee Tippet	1948	Dom.		10	30				Yes
9N/1W-13H2	0.85 mile east of "Nebo" main gate. 0.5 mile northwest of Highway 66 at head of "ditch" (formerly Dagget Ditch and Van Dyke Ditch)	California Electic Power Company Cool Water Steam Plant		Irr.				Ground water forced to surface by under-ground dam.			Yes
10N/2E-31R1	200 feet north of Highway 91 at inspection station, 1 mile east of Yermo.	State Department of Agriculture	1930	Dom.		10				Yes	Yes
10N/1W-32J1	1.5 mile northeast of Barstow, 0.6 mile west of Soapmine Road, 0.3 mile south of Highway 91	R. W. Dickenson	1950	Dom.		6	50			Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
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		COACHELLA VALLEY-SOUTH (7-21)									
5S/7E-16K1	2.65 mi. NW/o Indio, 0.5 mi. S/o Hwy 49, 300' W/o irrigation canal	Lester Roberson	10-31-51	Dom.		6	225	169-225	Yes		Yes
5S/7E-22K1	1.5 mi. W/o Indio, 1.3 mi. W/o intersection of Jackson Ave. & Hwy 99, 240' S/o Ave. 45	Z. E. Zalay	8-30-50	Dom.		6	200	144-200	Yes		Yes
5S/7E-33C1	2.5 mi. W/o Indio, 0.27 mi. S/o & 5.01 mi. W/o intersection of Madison Ave., and Ave. 48	J. N. Rameriz	7-25-51	Dom. Irr.		10	339	144-338	Yes		Yes
5S/8E-31D1	0.15 mi. S/o & 0.01 mi. E/o Van Buren Avenue & Hwy 60	Mitchel Land & Improvement Co.	8-12-50	Dom.		6	300	156-300	Yes		Yes
5S/8E-33N1	3 mi. SE/o Indio, 1.1 mi. E/o Hwy 111 & 264' N/o Avenue 50	E. M.Holm	3-14-51	Dom.		6	148	108-148	Yes		Yes
6S/7E-25E1	0.27 mi. S/o & 0.5 mi. E/o intersection of Jackson Ave. & Avenue 58	G. Phillips	2-14-51	Dom.		8	300	138-178; 242-300	Yes		Yes
6S/8E-7P1	0.03 mi. N/o & 0.4 mi. E/o intersection of Van Buren Ave. & Avenue 54	M. R. Shepard	7-7-50	Dom. Irr.		6	150	130-150	Yes		Yes
6S/8E-10A4*	2.25 mi. E/o Hwy 111, 500' S/o Avenue 52, 100' W/o Fillmore Ave.	E.H. McCain		Dom. Irr.		6	480				Yes
6S/8E-27H1	0.7 mi. N/o & 0.99 mi. E/o intersection of Polk & Avenue 60	J.E. Stroube	6-26-51	Dom.		6	700	412-552, 640-700	Yes		Yes
6S/9E-30C1	0.5 mi. E. & 0.01 mi. S/o intersection of Bucharan Street & 58th Avenue	N. Karahadian	7-21-50	Dom. Irr.		6	527	300-420	Yes		Yes
7S/8E-22M1	0.27 mi. N. & 0.02 mi. E/o intersection of Polk Street & Hwy 99	Vessey Brothers	12-15-50	Dom.		6	348	216-348	Yes		Yes
7S/9E-16K1	0.74 mi. E. & 0.01 mi. S/o intersection of National Avenue & Johnson Street	C. C. Crockett	10-20-52	Dom.		8	685	245-685	Yes		Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)
* 6S/8E-10A3 has been changed to -10A4

WELL DATA
1960

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		ANAHEIM BASIN PRESSURE AREA (8-1.01)									
5S/11W-21M3 577 F	50 feet east of Bolsa Chica Street 0.39 mile north of Wintersburg Avenue	C. C. Stedman	1935	Dom.	18	8	231	203-213, 225-228	Yes		Yes
5S/11W-21N2	300 feet east of Bolsa Chica Street 270 feet north of Wintersburg Avenue	L. W. Kvehne		Dom.		6	197				Yes
5S/11W-25R2	150 feet west of Cannery Street 0.29 mile north of Talbert Avenue	Harry C. Fulton	Prior to 1914	Dom.		8	145			Yes	Yes
5S/11W-27H4	500 feet north of Slater Avenue 125 feet west of Goldenwest Street	W. S. Tubach	2-13-48	Dom.	8	4	93		Yes	Yes	Yes
5S/11W-28H2	450 feet north of Slater 30 feet west of Springdale	Callens Brothers	1- 6-31	Irr.	5	14	354	70-82, 306-354	Yes	Yes	Yes
5S/11W-28K1 579 E	0.33 mile west of Springdale 45 feet south of Slater	Bolsa Land Company	11- 4-30	Irr.	4	14	917	60-85, 175-180 292-848	Yes	Yes	Yes
5S/11W-29C1	50 feet north of Los Patos Avenue 150 feet east of Algonquin Street, easterly of two wells	Sunset Land and Water Company	1931	Mun.	48	6	450	333-357, 348-416	Yes	Yes	Yes
5S/11W-33H1	4,450 feet south of Slater Avenue 2,800 feet west of Edwards Street 50 feet west of Tank Setting	Signal Oil and Gas Company	7-1940	Ind.		12	368	330-360			Yes
5S/11W-34F3	0.26 mile west of Edwards Street 0.74 mile north of Garfield between Bolsa 1&2A oil wells	Signal Oil and Gas Company	4-17-48	Ind.		12	773	464-773			Yes
5S/11W-36B2	0.58 mile east of Huntington Beach Boulevard 60 feet south of Talbert Avenue	Joseph J. Courreges	1921	Dom.		7	138	Open bottom	Yes		Yes
5S/11W-36P1	0.4 mile east of Huntington Beach Boulevard 0.07 mile north of Garfield Avenue	Ivan Harper	8-1923	Dom. Irr.	57	10	148		Yes		Yes
5S/12W-12C1	0.45 mile southwest of Los Alamitos Boulevard 750 feet west of Westminster Avenue	I. W. Hellman Ranch	1932	Dom. Irr. Stk.	13	12	705	417-473	Yes	Yes	Yes
6S/10W-5C1	20 feet south of Garfield 0.35 mile east of Wright	Robert Gisler		Irr.			210				Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA
1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available		
									Log	Water levels	Analyses
		ANAHEIM BASIN PRESSURE AREA (continued)									
6S/10W-6B2	125 feet south of Garfield 200 feet east of Bushard	William Lamb	1900	Dom.		2	100				Yes
6S/10W-6H2	50 feet west of Wright 0.45 mile south of Garfield Avenue	Walter Lamb	1948	Irr.			102				Yes
6S/10W-6L2	200 feet west of Bushard Street 0.5 mile south of Garfield Avenue	H. J. Lamb	Prior to 1919	Dom.	12	7	150			Yes	Yes
6S/10W-7D3	2,000 feet west of Bushard 200 feet south of Adams	Jim Bushard	1942	Dom.		4	125				Yes
6S/10W-18B4	150 feet east of Bushard 100 feet south of Atlanta Avenue	E. H. Gisler		Dom.		12	89			Yes	Yes
6S/11W-1B1	550 feet south of Garfield Avenue 0.28 mile west of Cannery Avenue	Robert Heil		Irr.	13.3	12	200			Yes	Yes
6S/11W-1J3	0.50 mile north of Adams 0.25 mile west of Cannery	Urbain Plavan		Irr.		12	133	100-111, 121-133			Yes
6S/11W-3R2	0.30 mile south of Mansion 300 feet west of Goldenwest extension	Huntington Beach Golf Course	1950	Irr. Dom.		8	279	180-279			Yes
6S/11W-13F4	120 feet north of Hamilton Street 400 feet west of Newland Avenue	Wilshire Oil Company	4-17-56	Ind.		10	200	164-184	Yes		Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA
1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
		CHINO BASIN (8-2.01)									
1S/6W-29R1	200 feet west of Etiwanda Avenue, 0.75 mile north of Marley Avenue	S. & S. Ranch		Irr. Dom.	922						Yes
1S/7W-28R1	400 feet south of intersection of Highway 60 and Corona Avenue, 50 feet east of Corona (Baker) Ave.	Peach Park Water Company	3-27-28	Irr. Dom.		16	351		Yes		Yes
1S/7W-34M1	125 feet east of Vineyard Avenue, 100 feet south of Francis Avenue	Wilder & Camel	Prior to 1929	Irr. Dom.	866	10	326				Yes
2S/7W-10M1	90 feet south of Chino Avenue, 0.12 mile east of Vineyard Avenue east of Chino	P. J. Crerolim		Irr. Dom.	747		375				Yes
2S/7W-15A1	0.55 mile south of Chino Avenue, 0.2 mile west of Archibald Avenue, north well of 2 wells, east of Chino	Pietro Enrico Domenico Enrico	1931	Dom.	726	8	436		Yes		Yes
2S/7W-21L1	40 feet west of Walker Avenue, 350 feet south of Merrill Avenue, 0.50 mile east of Grove Avenue	C. T. Merrill		Dom. Irr.	657	14	207		Yes	Yes	Yes
2S/7W-23E1	120 feet east of Archibald Avenue and 1267 feet north of Merrill Avenue	A. Omlin		Dom.	665	7	104				Yes
2S/7W-27A1	230 feet west of Archibald Avenue, 10 feet south of Cloverdale Road extended, westerly well of 2 wells, northeast of Norco	Luginbill and Imbach		Dom.	642		310				Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use[a]	Ground surface elevation[b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available		
									Log	Water levels	Analyses
		BUNKER HILL BASIN	(8-2.06)								
1N/4W-29E1	123 feet south of center line of Darby Street, 27 feet east of center line of California Street	Delman Water Co.		Dom.	1,304	16	429		Yes	Yes	Yes
1N/4W-29F1	500 feet southwest of Cajon Boulevard; 2,800 feet north of Highland Avenue, 2,000 feet east of California Street	Delman Water Co.	3-8-56	Mun.	1,278	16	451	240-340; 418-442	Yes	Yes	Yes
1S/3W- 9E2	400 feet east of Alabama Street, 175 feet north of road into rock company which is about 1,700 feet south of Third Street	Tri-City Rock Co.	Fall 1954	Ind. Dom.		14	400				Yes
1S/3W-16A1	Southeast of San Bernardino, 30 feet west of and 30 feet north of the north end of Texas Street at the Santa Ana River	Cook Orchards	1925 Deepened in 1954	Irr.	1,292	16	418	105-395	Yes	Yes	Yes
1S/4W-13F3	1,400 feet east of Tippecanoe, 150 feet north of Central Avenue	Mesbur Realty Co.	1926	Dom.	1,060	12	123	102-120			Yes
1S/4W-13G2*	2,500 feet east of Tippecanoe, 150 feet south of Central Avenue	Gage Canal Co.	1946	Irr.	1,063	24	415				Yes
1S/4W-13L1	At caretaker's house, near upper end of Gage Canal, 10 feet south of canal, 1,000 feet east of Tippecanoe, 1,300 feet north of San Bernardino Avenue	Gage Canal Co.	1890	Dom.		10	300				Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

* Changed from -G1

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available		
									Log	Water levels	Analyses
	MISSION BASIN, SAN LUIS REY VALLEY (9-7.01)										
11S/4W- 4N1	0.1 mile north of Mission San Luis Rey, 200' south of Camp Pendleton Road on east side of dirt road.	George Nagata	8-19-52	Irr. Dom.	69	14	131	104-131	Yes	Yes	Yes
11S/4W- 5K1	About 1 mile north of Mission San Luis Rey on north side of Pendleton Rd. east of two wells	Mrs. K. Johnson	3-25-53	Irr.		14	207	169-207	Yes		Yes
11S/4W- 5R1	1 mile north of Mission San Luis Rey, 600' south of Pendleton Road	Stokes Brothers	5-1-52	Irr.		14-9	132	100-130	Yes	Yes	Yes
11S/4W- 8H1	1050' East of county road running north from San Luis Rey, 45' south of private road	J. S. Alvarado	Jan. 1949	Irr. Dom.	60	12	121			Yes	Yes
11S/4W- 8J1	54' north of Highway 76, 51' east of road to Academy of the Little Flower	Academy of the Little Flower	Aug. 1951	Dom.		16	227		Yes	Yes	Yes
11S/4W- 8N1	1300' southwest of intersection of Highway 76 and Camp Pendleton Road, 87' south of Highway 76	Clarence Nishizu	March 1950	Dom. Irr.		14	180			Yes	Yes
11S/4W-18C1	2900 feet northeast along Highway 76 from pumping plant, 1760 feet northwest along private road, 15 feet southwest of road	R. Slaught	1937 ±	Irr. Dom.	42	14	134		Yes	Yes	Yes
11S/4W-18C9	150 feet west of Powerline. 2500 feet north of Highway 76 along Powerline.	Carlsbad Mutual Water Company		Mun.	32					Yes	Yes
11S/4W-18L3	1000 feet northeast of Carlsbad Pumping Plant, 30 feet north of Highway 76.	City of Oceanside	1939	Mun.	38	18	171	138-166	Yes	Yes	Yes
11S/4W-18L4	50 feet south of Highway 76, 160 feet east of Reservoir (N. Yard)	Carlsbad Mutual Water Company	1951	Mun.	32	16	204			Yes	Yes
11S/5W-13L1	400 feet south of San Luis Rey River, 2100 feet northwest of Highway 76.	Amsler	1948	Irr. Dom.			104	86-104	Yes		Yes
11S/5W-13Q1	1220 feet northwest of Oceanside Pala Highway at City of Oceanside Booster Plant 906 feet northeast of private road (at end of Oceanside Airport runway)	City of Oceanside	1936	Mun.		18	160	140-160		Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U. S. Geological Survey datum (Feet above mean sea level unless otherwise indicated)

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available		
									Log	Water levels	Analyses
		EL CAJON VALLEY (9-16)									
15S/1E-31R1	220 feet east of Highway 80 and 0.16 mile north of Flume Drive, north east of El Cajon	R. G. Alexander	1948	Dom. Irr.		8	112			Yes	Yes
16S/1W-1G1	30 feet west of Bostonia Street, 0.24 mile north of Broadway	Jack Graves	1948	Dom. Irr.	508	48	64			Yes	Yes
16S/1W-2K6	250 feet south of Broadway, 0.28 miles west of First Avenue, north of El Cajon	Bob Glib	1920	Dom.	448	72	50		Yes	Yes	Yes
16S/1W-3C2	At El Cajon sewage plant, 140 feet east of old railroad crossing, 0.40 mile north of Broadway, El Cajon	City of El Cajon	1952	Dom.		8					Yes
16S/1W-10D1	0.43 mile north of Main Street, 300 feet east of Pierce Street, west of El Cajon	Ed Fletcher Co.	1946	Dom.*		8	521		Yes	Yes	Yes
16S/1W-11P4	50 feet north of Camden Avenue, 141 feet east of Taft Avenue, El Cajon	J. M. Conaway	1949	Irr.	448	24	50			Yes	Yes
16S/1W-15K2	40 feet south of Chase Avenue, 0.28 mile west of Magnolia Avenue	R. S. Embleton	9-1950	Dom.		60	24			Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)
* Subdivision

WELL DATA

1960

State well number and other number	Location	Owner	Date completed	Use [a]	Ground surface elevation [b]	Size of casing in inches	Total depth in feet	Intervals of perforated casing in feet	Data available: Log	Data available: Water levels	Data available: Analyses
		TIA JUANA VALLEY BASIN (9-19)									
18S/2W-32H1	0.25 mile south of Sunset, 0.12 mile east of 15th Street extended.	California Water and Telephone Company	Prior to 1919	Test	11.5	10	28	None, open bottom		Yes	Yes
18S/2W-32P4	0.03 mile east of west end of Sunset Avenue (Banana)	California Water and Telephone Company	8-28-47	Test	7	8	100	85-98		Yes	Yes
18S/2W-35L1	200 feet east of Gate 2 Road (Dairy Mart Road) 100 feet north of Freeway 101, North Frontage Rd.	Henry Schaffner	5-1950	Irr.	45		101		Yes		Yes
19S/2W-2E1	West side Gate 2 (Dairy Mart) Road, 0.35 mile south of Tia Juana River			Irr.	33						Yes
19S/2W-3A1	0.25 mile west of Gate 2 (Dairy Mart) Road, 0.25 mile south of Tia Juana River	Aballo and Wright		Irr.		12					Yes
19S/2W-4A5	720 feet west of National Avenue, 0.32 mile south of Sunset Avenue (Banana)	California Water and Telephone Company	6-1919	Dom., Mun.	24	12	78			Yes	Yes
19S/2W-5C6	0.5 mile south of Sunset (Banana), 1.22 mile west of 19th Street	California Water and Telephone Company	10-8-47	Test	9	8	100	89-98		Yes	Yes
19S/2W-5G18	0.25 mile north of Monument Road, 0.8 mile west of 19th Street	Knox Dairy Farm		Irr.	12	8	107			Yes	Yes
19S/2W-5L2	15 feet north of Monument Road on the eastern boundary of Border Field (extended northerly)	California Water and Telephone Company	9-30-47	Test	7	10	96	85-94	Yes	Yes	Yes

a Domestic (Dom), Municipal (Mun), Irrigation (Irr), Industrial (Ind), Livestock (Stk), Military (Mil), and Observation (Obs).
b U S Geological Survey datum (Feet above mean sea level unless otherwise indicated)

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						SANTA MARIA RIVER VALLEY (3-12)																	
E. C. Lyman Dom. - Obs.	9N/32W-17G1	4- 6-60	---	1409	8.2					0 / 0.00	359 / 5.89		40 / 1.13								669	375	Term
		10-12-60	---	1390	7.7					0 / 0.00	360 / 5.90		37 / 1.05								705	410	DWR
Lake Marie Farms Dom.	9N/33W-8K1	10-12-60	---	877	8.0	94 / 4.69	34 / 2.79	50 / 2.18	2.2 / 0.06	0 / 0.00	259 / 4.24	214 / 4.46	35 / 0.99	3.0 / 0.05	0.5 / 0.03	0.06	36		600	22	374	162	DWR
W. E. Houke Estate Dom.	9N/33W-9A1	4- 6-60	---	649	7.3	17 / 0.84	12 / 1.02	84 / 3.63	3 / 0.08	0 / 0.00	53 / 0.87	15 / 0.32	142 / 3.98	13 / 0.22	0.12 / 0.01	0	40		396	65	93	49	Term
		10-12-60	---	620	7.7	17 / 0.85	10 / 0.82	83 / 3.61	2.4 / 0.06	0 / 0.00	44 / 0.72	8 / 0.17	145 / 4.09	23 / 0.37	0.4 / 0.02	0.02	70		375	68	84	48	DWR
Blockman School Dom.	9N/33W-12R1	4- 6-60	---	957	7.45	88 / 4.41	49 / 4.02	46 / 2.01	2.4 / 0.06	0 / 0.00	245 / 4.02	266 / 5.55	31 / 0.87	0 / 0	0.38 / 0.01	0	27		681	19	421	220	Term
		10-12-60	---	1071	8.3	101 / 5.04	59 / 4.85	56 / 2.44	2.2 / 0.06	19 / 0.64	244 / 4.00	322 / 6.70	29 / 0.82	15 / .24	0.6 / 0.03	0.10	31		770	20	491	259	DWR
Mattia Bogunda Irr.	9N/34W-9E1	11-16-60	---	750	7.1	57 / 2.84	22 / 1.84	59 / 2.55	2.5 / 0.06	0 / 0.00	145 / 2.38	93 / 1.95	113 / 3.17	0 / 0	0.6 / 0.03	0.72	38		468	35	234	115	Lein
Grisingher and Signorelli Irr.	10N/34W-6N1	11-18-60	64	1645	7.5	184 / 9.18	88 / 7.15	77 / 3.35	1.4 / 0.04	0 / 0.00	305 / 5.0	577 / 12.03	62 / 1.75	72 / 1.17	1.1 / 0.06	0.28	23		1348	17	817	567	Lein
J. J. O'Leary Dom. - Irr.	10N/34W-16R1	11-17-60	65	1710	8.0	171 / 8.53	90 / 7.37	111 / 4.83	4.0 / 0.10	0 / 0.00	281 / 4.60	647 / 13.47	74 / 2.08	73 / 1.18	0.7 / 0.04	0.25	22		1420	23	797	567	Lein
Tenant: E. J. Moore Irr.	10N/34W-19H1	11-22-60	---	1180	7.4	116 / 5.78	57 / 4.69	71 / 3.10	3.3 / 0.08	0 / 0.00	266 / 4.36	373 / 7.76	44 / 1.22	7.0 / 0.12	0.8 / 0.04	0.26	21	ABS-0.16 PPM PO_4-0.11 PPM	936	13	524	306	Lein
George Pertusi Irr. - Ind.	10N/34W-28A1	11-17-60	66	1112	7.7	114 / 5.69	55 / 4.54	64 / 2.80	3.4 / 0.09	0 / 0.00	235 / 3.85	379 / 7.88	52 / 1.45	4.7 / 0.08	0.9 / 0.05	0.18	16	ABS-0.11 PPM PO_4-0.18 PPM	754	21	512	319	Lein
Union Sugar Company Dom. - Irr.	10N/35W-5J1	11-17-60	---	1378	7.9	140 / 7.02	68 / 5.58	76 / 3.30	3.2 / 0.08	0 / 0.00	236 / 3.86	491 / 10.22	67 / 1.88	17 / 0.27	1.0 / 0.05	0.31	16		946	21	630	437	Lein
Mary J. Ellis Dom. - Irr.	10N/35W-7F1	11-11-60	---	1669	7.5	198 / 9.88	84 / 6.85	86 / 3.75	3.0 / 0.08	0 / 0.00	281 / 4.60	643 / 13.38	102 / 2.87	1.5 / 0.02	0.4 / 0.02	0.28	25	Fe-0.3 PPM Tot. Cr-0 As-0 Sr-0.7 PPM Al, Mn, Zn, Pb, Cu=0	1318	18	837	607	Lein

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
SANTA MARIA RIVER VALLEY (continued)																							
Waller Flower Seed Company Irr. - Dom.	10N/35W-9F1	11-17-60	65	1845	7.4	215 / 10.73	96 / 7.90	106 / 4.60	4.6 / 0.12	0 / 0.00	264 / 4.33	783 / 16.30	102 / 2.87	14 / 0.24	0.6 / 0.03	0.39	24		1582	20	932	715	Lein
Mary Donovan Irr.	10N/35W-21C1	10-13-60	63	1464	8.1	88 / 4.39	66 / 5.43	130 / 5.66	3.6 / 0.09	0 / 0.00	146 / 2.40	423 / 8.82	133 / 3.75	40 / 0.65	0.5 / 0.03	0.14	38		1010	36	491	371	DWR
Avilina Morgante Irr.	10N/36W-12R1	11-17-60	---	995	7.4	100 / 5.00	45 / 3.65	55 / 2.40	2.2 / 0.06	0 / 0.00	222 / 3.63	286 / 5.96	52 / 1.46	9.4 / 0.15	0.6 / 0.03	0.15	27		710	22	433	251	Lein
Frank Silva Dom. - Irr.	11N/34W-19Q1	4- 8-60	---	1082	8.0	98 / 4.90	47 / 3.88	62 / 2.70	3 / 0.06	0 / 0.00	215 / 3.52	289 / 6.03	68 / 1.93	6 / 0.06	0.37 / 0.02	0.12	31		770	23	439	263	Term
		10-13-60	---	925	8.3	89 / 4.45	36 / 3.00	56 / 2.45	2.0 / 0.05	4 / 0.12	194 / 3.18	220 / 4.58	67 / 1.90	6.8 / 0.11	0.5 / 0.03	0.08	25		630	25	373	208	DWR
Union Sugar Company Dom. - Irr.	11N/34W-29P2	4- 6-60	---	1047	8.0					0 / 0.00	206 / 3.38		72 / 2.01								411	242	Term
Union Suguar Company Dom. - Irr.	11N/35W-18M1	4- 6-60	---	1389	8.25	134 / 6.72	62 / 5.08	84 / 3.64	4 / 0.11	0 / 0.00	211 / 3.47	514 / 10.71	56 / 1.58	0 / 0	0 / 0	0	24		1020	23	590	417	Term
Union Sugar Company Dom. - Irr.	11N/35W-28B1	4- 6-60	64	873	8.10	82 / 4.09	32 / 2.60	52 / 2.24	3 / 0.07	0 / 0.00	172 / 2.82	234 / 4.87	44 / 1.22	10 / 0.16	0.26 / 0.01	0.01	27		620	25	335	194	Term
Union Sugar Company Irr.	11N/35W-33F1	10-13-60	---	1890	7.6	228 / 11.40	91 / 7.50	97 / 4.23	4.3 / 0.11	0 / 0.00	470 / 7.70	618 / 12.86	92 / 2.60	15 / 0.24	2.3 / 0.12	0.08	25		1460	18	945	560	DWR
Mary B. Enos	11N/36W-13R1	4- 6-60	---	1208	8.10	114 / 5.69	58 / 4.75	73 / 3.18	3.1 / 0.08	0 / 0.00	193 / 3.16	440 / 9.17	48 / 1.35	0 / 0	0.22 / 0.01	0.10	8		856	23	522	364	Term

a,b,c, see footnotes at end of tables.

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
								CUYAMA RIVER VALLEY (3-13)															
Apache School Dom.	7N/24W-13C2	7- 6-60		1838	7.2	200 10.00	111 9.12	91 3.95	3.5 0.09	0 0.00	105 1.72	1008 20.89	13 0.35	0 0	0.8 0.04	0.40	5		1642	17	956	870	Lein
		10-11-60		1888	7.8	263 13.12	112 9.12	91 3.96	4.0 0.10	0 0.00	224 3.68	1069 22.28	13 0.37	0.5 0.01	1.1 0.06	0.24	12		1750	15	1114	930	DWR
U. S. Government (Forest Service)	9N/24W-19F1	7- 6-60		1830	7.5	233 11.63	95 7.81	78 340	3.4 0.09	0 0.00	187 3.06	941 19.60	16 0.45	5.0 0.08	0.1 0.06	0.26	12		1540	15	972	819	Lein
		10-11-60		1742	8.4					19 0.64	154 2.52		18 0.51								999	841	DWR
H. S. Russel	10N/25W-20H1	7- 6-60		1856	8.0	234 11.72	96 7.94	73 3.17	4.0 0.10	0 0.00	116 1.90	987 20.55	16 0.44	11 0.18	0.7 0.04	0.36	16		1596	14	983	888	Lein
		10-11-60	61	1723	8.0					0 0.00	142 2.32		14 0.39								972	856	DWR
E. H. Mettler and Sons	10N/25W-21G1	7- 6-60	67	2132	7.5					0 0.00	201 3.30		18 0.51								1165	1000	Lein
		10-11-60	61	1988	7.5					0 0.00	205 3.36		17 0.48								1185	1017	DWR
E. H. Mettler and Sons	10N/25W-22E1	7- 6-60		2140	7.9	277 13.80	112 9.23	90 3.90	4.1 0.12	0 0.00	189 3.10	1101 22.92	19 0.52	24 0.39	0.6 0.03	0.55	17		1890	14	1252	1097	Lein
		10-11-60	62	1917	7.6					0 0.00	190 3.12		16 0.45								1097	941	DWR
E. H. Mettler and Sons	10N/25W-23E1	7- 6-60		2170	7.6					0 0.00	134 2.20		121 3.40								915	810	Lein
Pam Barkley	10N/25W-32H1	7- 6-60		1748	7.6					0 0.00	179 2.93		22 0.62								902	755	Lein
		10-11-60	62	1667	8.0					0 0.00	113 1.85		21 0.60								893	800	DWR
Hubert Russel	10N/26W-4R1	7- 6-60		1830	7.9	220 11.00	80 6.55	107 4.65	4.6 0.12	0 0.00	119 1.95	941 19.60	36 1.00	3.6 0.06	0.6 0.03	0.58	21		1536	21	853	793	DWR

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25° C)	pH	Mineral constituents in parts per million / equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
								CUYAMA RIVER VALLEY (continued)															
Hubert Russel (cont.)	10N/26W-4R1	10-11-60	67	1820	8.2					0 0.00	113 1.85		35 1.00								885	793	DWR
Cuyama Ranch	10N/26W-14C1 C2 C3	7- 6-60		1950	7.9					0 0.00	177 2.90		20 0.56								1048	903	Lein
		10-11-60	55	1956	8.1					0 0.00	195 3.20		19 0.53								1146	986	DWR
H. Russel	10N/26W-14C4	7- 6-60		1925	7.4	234 11.68	96 7.93	80 3.48	1.2 0.03	0 0.00	192 3.15	944 19.66	24 0.68	2.7 0.04	0.5 0.03	0.21	15		1592	15	981	823	Lein
		10-11-60	65	1800	7.7	248 12.40	97 8.00	81 3.54	3.5 0.09	0 0.00	180 2.95	985 20.50	14 0.40	4.0 0.06	1.3 0.07	0.15	22		1546	15	1021	874	DWR
Stanley Germain	10N/26W-21Q2	10-11-60	78	1242	8.3	74 3.69	19 1.56	175 7.61	3.4 0.09	14 0.48	144 2.36	473 9.85	13 0.37	2.5 0.04	1.2 0.06	0.30	43		910	59	263	121	DWR
Goehring Brothers	10N/26W-23P1	7- 6-60		2055	7.5					0 0.00	161 2.63		30 0.85								1083	951	Lein
		10-11-60	70	1980	7.8					0 0.00	104 1.70		32 0.90								1085	1000	DWR

a,b,c. See footnotes at end of tables.

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Mineral constituents in parts per million / equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents[a]	Total dissolved solids in ppm[b]	Percent sodium	Hardness as $CaCO_3$: Total ppm	NC ppm	Analyzed by[c]
OXNARD PLAIN PRESSURE AREA (4-4.01)																							
Ed Murhardt Dom.	1N/21W-30A1	5-16-60		1100	7.75	94 4.72	31 2.58	93 4.05	4 0.11	0 0.00	311 5.10	257 5.35	45 1.27	0 0	0.4 0.02	0.92	16		800	35	365	110	Term
		12-8-60		1170	7.6	102 5.11	46 3.79	94 4.10	4.4 0.11	0 0.00	273 4.48	354 7.36	49 1.38	0 0	0.4 0.02	0.54	24		792	31	495	271	Lein
Point Mugu Game Preserve	1N/21W-31A1	5-16-60		1176	7.5					0 0.00	261 4.29		44 1.22								452	238	Term
		12-6-60		1110	7.8	126 6.28	37 3.05	94 4.10	4.1 0.11	0 0.00	265 4.35	379 7.88	40 1.14	1.6 0.03	0.5 0.03	0.69	28		822	30	467	249	Lein
City of Oxnard	1N/22W-3F4	5-18-60	67	1608	7.75					0 0.00	305 5.00		65 1.83								682	432	Term
		12-9-60	66	1490	8.0					0 0.00	293 4.80		60 1.67								636	396	Lein
D. McGrath Estate Co.	1N/22W-7D1	5-18-60		1206	7.35					0 0.00	249 4.09		43 1.20								470	266	Term
		12-7-60	67	1158	7.8					0 0.00	248 4.06		44 1.22								481	278	Lein
Alvarez	1N/22W-8K3	5-18-60		1205	7.6					0 0.00	255 4.19		41 1.15								480	271	Term
		12-7-60		1160	7.3	112 5.62	38 3.15	84 3.65	4.1 0.11	0 0.00	224 3.67	383 7.98	37 1.02	0 0	0.9 0.05	1.26	20		812	29	439	255	Lein
City of Oxnard	1N/22W-15B3	5-18-60		1315	7.5					0 0.00	262 4.30		52 1.46								520	315	Term
City of Oxnard		12-7-60	66	1415	7.8					0 0.00	274 4.50		50 1.41								548	323	Lein
U. S. Navy Port Hueneme	1N/22W-17J2	4-5-60	66	2257	7.4	235 11.73	89 7.32	118 5.13	6.6 0.17	0 0.00	224 3.68	411 8.57	418 11.79	0[e] 0	0.8 0.04	0.60	32		1625	21	952		DWR
		11-2-60	66	5740	7.4	661 33.00	176 14.50	187 8.13	7.9 0.20	0 0.00	204 3.35	530 11.04	1773 50.00	0 0	0.5 0.03	0.91	23		4176	12	2375	2207	Lein
Hollywood Beach Resort	1N/22W-18E1	5-18-60		1249	7.95					0 0.00	250 4.10		49 1.38								280	485	Term

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25° C)	pH	Mineral constituents in parts per million / equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$: Total ppm	Hardness as $CaCO_3$: NC ppm	Analyzed by c
						OXNARD PLAIN PRESSURE AREA (continued)																	
Hollywood Beach Resort	1N/22W-18E1	12-7-60		1340	7.8	128 6.39	46 3.79	80 3.47	5.8 0.15	0 0.00	250 4.10	408 8.50	45 1.27	0 0	0.9 0.05	0.75	24		842	25	509	304	Lein
Hollywood-by-the-Sea Mutual Water Company	1N/22W-19B3	6-7-60		1132	7.48	113 5.63	37 3.05	89 3.87			249 4.09	335 6.98	42 1.18		0.75 0.04	0.54				30.8	434		F.G.L.
Silver Strand Water Company	1N/22W-19H1	11-1-60	67	29900	7.3	1655 87.75	750 62.00	4600 200.00	16 0.41	0 0.00	228 3.74	1736 36.14	10972 309.25	0 0	0.5 0.03	2.00	20		23112	58	7238	7051	Lein
Silver Strand Mutual Water Company	1N/22W-20E1	12-23-60	76	17300	7.1	1330 66.25	593 48.75	2000 87.00	20 0.52	0 0.00	214 3.50	1098 22.87	6294 177.50	0.7 0.01	0.2 0.01	1.24	22		14574	43	5750	5575	Lein
Silver Strand Mutual Water Company	1N/22W-20E2	5-18-60		1195	7.6					0 0.00	235 3.85		39 1.10								443		DWR
		12-6-60		1200	7.5	137 6.84	30 2.45	86 3.75	4.3 0.11	0 0.00	245 4.02	395 8.23	39 1.07	0.8 0.01	0.5 0.03	0.61	28		862	28	465	264	Lein
U. S. Navy	1N/22W- 20R1	4-4-60	68	21410	7.2	856 42.71	611 50.29	3200 139.2	37 0.95	0 0.00	243 3.98	1259 26.22	7150 201.6	4 0.06	1.3 0.07	1.52	20		15580	60	4650	4452	DWR
	1N/22W-20R1	11-2-60	67	10200	7.8	621 31.00	250 20.60	1104 48.00	17 0.44	0 0.00	192 3.15	653 13.59	2978 84.00	4.3 0.07	1.2 0.06	0.69	29		6185	48	2580	2423	DWR
City of Port Hueneme	1N/22W-21L1	11-2-60	67	16600	7.6	1710 85.50	563 46.25	1700 74.00	0.36 14	0 0.00	203 3.33	1512 31.48	6150 173.50	0 0	0.05 0.03	1.25	20		13776	36	6585	6418	Lein
City of Port Hueneme	1N/22W-21L2	11-1-60	67	890	7.8	58 2.92	27 2.15	79 3.43	3.9 0.10	0 0.00	183 3.00	73 1.52	145 4.09	3.8 0.06	0.4 0.02	0.61	6		638	40	254	104	Lein
K. L. Varnau	1N/22W-23C1	5-18-60		1210	7.4					0 0.00	250 4.10		62 1.75								470	265	Term
		12-8-60	68	1158	7.7					0 0.00	255 4.19		59 1.65										Lein
S. A. Pidduck	1N/22W-26A1	5-16-60		1183	7.45					0 0.00	261 4.28		46 1.30								465	251	Term
		12-8-60		1129	8.1					0 0.00	264 4.32		43 1.21								452	236	DWR

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						OXNARD PLAIN PRESSURE AREA (continued)																	
R. L. Williams	1N/22W-28A2	5-16-60		8439	7.25	507 25.28	649 53.36	243 12.55	10.3 0.27	0 0.00	188 3.08	523 10.88	2710 76.31	0 0	0.18 0.01	0.58	20		5134	12	3932	3178	Term
Kalof Pulp & Paper Co.	1N/22W-28H2	5-16-60	67	1222	7.4					0 0.00	257 4.21		59 1.65								475	265	Term
Ventura County Oame Preserve	1N/22W-36K1 10-W-21	5-16-60		1355	7.55	135 6.73	41 3.36	96 4.17	40 1.02	0 0.00	271 4.45	303 6.03	148 4.15	6 0.086	0.4 0.02	0.68	26		978	27	505	283	Term
Ventura County Oame Preserve	1N/22W-36K8 10-W-23	12-27-60	68	9100	7.3	605 30.20	261 21.50	1030 44.80	22 0.55	0 0.00	98 1.60	735 15.31	2828 79.75	4.5 0.07	1.0 0.05	0.74	7		6101	46	2585	2505	DWR
Brightview Motel	2N/22W-27M2	5-19-60		1271	7.8					0 0.00	259 4.25		49 1.38								505	293	Term
		12-6-60		1309	7.5	136 6.80	44 3.58	92 4.00	4.1 0.11	0 0.00	262 4.30	410 8.54	51 1.44	14 0.23	0.7 0.04	0.73	24		916	28	519	304	Lein
Frank McGrath Estate	2N/23W-25Q1	5-18-60		1382	7.6					0 0.00	256 4.20		63 1.77								495	285	Term
		12-6-60		1362	7.7					0 0.00	262 4.30		66 1.86								490	275	Lein

a,b,c, see footnotes at end of tables

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						WEST COAST BASIN; SANTA MONICA BAY AREA (4-11.02)																	
Dept. of Water and Power, City of L. A.	2S/15W-34K1	3- 9-60	68	1010	8.5	65 3.25	27.4 2.24	93.2[d]			16.4 0.27	89.7 1.89	154 4.33	40 0.65					630		276		LACFCD
		12-14-60	70	1000	8.15	67.3 3.36	28.0 2.30	106[d]		0 0.00	313 5.13	49.8 1.04	145 4.10	0					709		284		LACFCD
Standard Oil Co.	3S/14W-7K2	3-17-60	75	1010	8.1					0 0.00	503 8.25		80 2.25								238		DWR
		10-24-60	74	970	8.3	47 2.35	27 2.25	141 6.13	9.7 0.25	7.2 0.24	483 7.92	18 0.38	77 2.17	2.0 0.03	0.5 0.03	0.42	26		623	56	230	0	DWR
Calif. Water Service Co.	3S/14W-29M1	3-22-60	74	728	7.7					0 0.00	238 3.90		96 2.70								223		DWR
		10-21-60	74	750	8.0					0 0.00	241 3.95		99 2.81								232	34	LEIN
City of Manhattan Beach	3S/14W-30G1	3-23-60	74	1340	7.7					0 0.00	192 3.15		308 8.70								445	287	DWR
		10-21-60	74	1669	7.6					0 0.00	219 3.58		383 10.80								555	376	LEIN
	3S/14W-30H2	3-23-60	74	788	7.7					0 0.00	232 3.80		119 3.35								235	45	DWR
		10-21-60	74	849	7.8					0 0.00	240 3.94		127 3.57								243	46	LEIN
Calif. Water Service Co.	3S/14W-31A3	4- 6-60	74 Pumping 1 min.	953	7.7					0 0.00	185 3.04		196 5.53								228		DWR
		4- 6-60	74 Pumping 1 hr.	932	8.1	58 2.89	20 1.63	100 4.35	0 0.0	0 0.00	193 3.16	10 0.21	189 5.33	0 0.0	0.10 0.005	0.12	3		525	49	226		DWR
		10-20-60	74 Pumping 3 min.	897	7.8					0 0.00	220 3.60		163 4.58								205	25	LEIN
		10-20-60	74 Pumping 1 hr.	817	8.0	68 3.40	20 1.62	68 2.95	4.2 0.10	0 0.00	250 4.10	38 0.79	120 3.39	0 0	0.1 0.01	0.12	17		476	37	251	46	LEIN
Alvin A. Selleck	3S/14W-32F1	4- 6-60	72	749	8.0	68 3.39	20 1.64	58 2.52	5.0 0.13	0 0.00	244 4.00	32 0.67	101 2.85	1.0 0.02	0.44 0.02	0.06	31		435	33	252		DWR

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						WEST COAST BASIN; SANTA MONICA BAY AREA (continued)																	
L. A. Co. F. C. D.	3S/15W-3A1	3-10-60	71.6	16860	8.0	652 / 32.55	434 / 35.70	2297[d]		0 / 0.00	436 / 7.15	725 / 15.10	5940 / 167.50	5.0 / 0.08							3422		LACFCD
	3S/15W-11M5	3-11-60	71.6	26140	8.2	642 / 32.05	103 / 8.50	5888[d]		0 / 0.00	208 / 3.41	1378 / 28.70	9360 / 264.0	30 / 0.49				NH_4 - OPPM			4030		LACFCD
City of El Segundo	3S/15W-12H2	2- 3-60	71.6	1690	7.4	136 / 6.80	50 / 4.10	137 / 5.95	9.7 / 0.25	0 / 0.00	358 / 5.86	97 / 2.01	337 / 9.50	0							545		LACFCD
		3- 7-60	71.6	1670	7.8	136 / 6.80	45 / 3.70	149[d]		0	342 / 5.60	111 / 2.31	322 / 9.08	0							525		LACFCD
		5-16-60	72	1712	7.7	135 / 6.75	45.8 / 3.78	154[d]		0	355 / 5.81	106 / 2.20	326 / 9.20	0							527		LACFCD
		7- 6-60	71.6	1680	7.4	135 / 6.75	44 / 3.60	158 / 6.87	2.0 / 0.05	0	351 / 5.72	113 / 2.36	310 / 8.75	0							519		
City of El Segundo	3S/15W-12H3	3-21-60	71	923	8.0	65 / 3.25	26 / 2.10	95 / 4.15	6.6 / 0.17	0 / 0.00	506 / 6.65	7 / 0.14	101 / 2.85	1.2 / 0.02	0.3 / 0.02	0.23	31		517	43	268	0	DWR
		10-24-60	70	950	7.8					0 / 0.00	394 / 6.45		105 / 2.95								279	0	DWR
Standard Oil Co.	3S/15W-13R2	3-17-60	72	1090	7.7					0 / 0.00	204 / 3.35		259 / 7.30		0.3 / 0.02						310		DWR
		10-26-60	69	1228	7.4	55 / 2.75	44 / 3.55	105 / 4.55	11 / 0.28	0 / 0.00	183 / 3.00	10 / 0.21	280 / 7.89	0 / 0	0.2 / 0.01	0.14	13		728	41	315	165	LEIN
	3S/15W-13R6	10-31-60		1033	7.7	81.6 / 4.08	25.7 / 2.09	94[d]		0	338 / 5.53	1.6 / 0.04	166 / 4.68	0					713		310		LACFCD
City of Manhattan Beach	3S/15W-25A3	2-19-60	71.6	1470	7.95	5.08 / 2.54	11.4 / 0.94	266[d]		0	180 / 2.95	294 / 6.11	212 / 5.98	0					1010		174		LACFCD
		10-21-60	71.6	1460	7.8	46.6 / 2.34	11.5 / 0.95	253[d]		0	160 / 2.61	301 / 6.25	188 / 5.30	5.0 / 0.08					965		164		LACFCD
L. A. Co. F. C. D.	4S/14W-17F1	5-13-60		2560	8.5	188 / 9.40	71.7 / 5.87	244[d]		0	300 / 4.91	5.8 / 0.11	740 / 20.87	0					1550		765		LACFCD
		11-10-60		2530	7.9	187 / 9.35	70.1 / 5.71	233[d]		0	292 / 4.79	4.1 / 0.08	720 / 20.30	0					1510		756		LACFCD

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Mineral constituents in parts per million / equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$: Total ppm	N.C. ppm	Analyzed by c
						WEST COAST BASIN; SANTA MONICA BAY AREA (continued)																	
Del Amo Estates Co.	4S/14W-17H2	2- 3-60	61	720	8.3	37 / 1.85	13 / 1.10	105 / 4.55	6.5 / 0.17	0	268 / 4.40	17.7 / 0.37	100 / 2.82	0					549		135		LACFCD
		12-13-60	64	689	8.00	30 / 1.50	19 / 1.60	90[d]		0 / 0.00	277 / 4.55	7.4 / 0.15	81 / 2.28	0 / 0				NH_4 - OPPM	504		129		LACFCD

a, b, c, d. See footnotes at end of tables.

ANALYSES OF GROUND WATER

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Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Mineral constituents in parts per million / equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$: Total ppm	N.C. ppm	Analyzed by c
						WEST COAST BASIN HAWTHORNE-GARDENA AREA (4-11.02)																	
Henry Ishida 653 E. 165th Street	3S/13W-29G3	3-16-60	65	1145	7.6	118 5.89	24 1.97	88 3.83	5.0 0.13	0 0.00	307 5.04	111 2.31	153 4.31	0 0.00	0.42 0.02	0.14	26		715	32	392		DWR
		10-19-60	70	1157	7.8					0 0.00	315 5.16		169 4.77								403	145	DWR
Mrs. Distel 685 W. 184th Street	3S/13W-31F1	10-18-60	74	1762	7.7					0 0.00	331 5.43		291 8.21								624	352	Lein
Park Water Company 4206 E. Rosecrans Avenue, Compton	3S/14W-22R2	3-23-60	72	1123	7.6					0 0.00	211 3.45		277 6.40								345	172	DWR
		10-28-60	69	1377	7.8	113 5.64	32 2.63	115 5.00	5.8 0.15	0 0.00	183 3.00	52 1.08	326 9.17	1.5 0.02	0.4 0.02	0.62	24		880	37	414	264	DWR
J. Scander 14507 S. Vermont Avenue	3S/14W-24A1	10-60	-	818	7.4					0 0.00	254 4.16		111 3.13								270	62	DWR
Wilbur Hornstra	3S/14W-25K4	3-15-60	-	608	7.6					0 0.00	224 3.68		59 1.66								210		DWR
		10-26-60	69	613	7.6					0 0.00	217 3.55		64 1.80										
Los Angeles County Park Department	3S/14W-27C1	3-24-60	68	1005	7.5					0 0.00	220 3.60		215 6.05								358		DWR
		10-25-60	70	1127	7.7	99 4.94	27 2.26	90 3.92	5.1 0.13	0 0.00	223 3.66	54 1.13	218 6.15	2.5 0.04	0.4 0.02	0.06	19		734	35	360	177	DWR
Moneta Water Co.	3S/14W-35M5	3-22-60	74	505	7.4					0 0.00	247 4.05		39 1.10								145		DWR
		10-18-60	74	462	7.2					0 0.00	254 4.16		32 0.09								133		DWR

a, b, c See footnote at end of tables

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO3)	Bicarbonate (HCO3)	Sulfate (SO4)	Chloride (Cl)	Nitrate (NO3)	Fluoride (F)	Boron (B)	Silica (SiO2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as CaCO3 Total ppm	Hardness as CaCO3 NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
WEST COAST BASIN: TORRANCE AREA (4-11.02)																							
George Branning 19825 Main Street	4S/13W-6Q1	3-23-60	67	1250	7.6					0 0.00	302 4.95		90 2.55								418		DWR
		10-60	--	1110	8.1	106 5.30	27 2.20	99 4.30	4.7 0.12	0 0.00	247 4.05	248 5.17	85 2.40	4.0 0.07	0.5 0.03	0.06	24		754	36	375	173	DWR
Chanslor-Canfield Midway Oil Company	4S/14W-9Q1	3-17-60	72	1140	7.9					0 0.00	275 4.50		227 6.40								160		DWR
		10-20-60	--	1015	7.8	29 1.43	16 1.28	159 6.90	5.0 0.13	0 0.00	270 4.43	0 0	187 5.27	0 0	0.6 0.03	.51	25		584	71	136	0	LEIN
City of Torrance	4S/14W-16L2	3-23-60	--	656	7.7					0 0.00	275 4.50		82 2.30								123		DWR
		10-19-60	74	772	7.5	28 1.40	15 1.22	106 4.60	6.6 0.17	0 0.00	276 4.53	30 0.63	85 2.39	0 0	0.1 0.01	0.23	28		442	62	131	0	LEIN
Union Oil Company of California	4S/14W-22Q1	3-17-60	66	974	7.4	41 2.05	13 1.05	149 6.50	3.5 0.09	0 0.00	156 2.55	235 4.90	76 2.15	1.9 0.03	0.3 0.02	0.15	14		600	67	155		DWR
		10-25-60	72	670	8.0	27 1.35	10 0.80	107 4.64	3.1 0.08	0 0.50	241 3.95	51 1.07	64 1.80	0.6 0.01	0.4 0.02	0.25	30		415	68	108	0	DWR
Sidabotham and Son 715 East "L" Street Wilmington	4S/14W-35E1	3-15-60	--	1056	7.4	74 3.69	28 2.30	112 4.87	7.0 0.18	0 0.00	368 6.04	55 1.15	133 3.75	0 0	0.38 0.02	0.20	35		620	44	301		DWR
		10-28-60	69	1085	7.9	85 4.25	26 2.10	114 4.95	5.9 0.15	0 0.00	394 6.45	36 0.74	147 4.15	1.9 0.03	0.4 0.02	0.13	34		620	43	318	0	DWR
Chandler Sand & Gravel	4S/14W-35F2	3-15-60	--	1920	7.5	97 4.85	36 3.00	167 7.25	6.3 0.16	0 0.00	391 6.40	164 3.41	179 5.05	1.7 0.03	0.5 0.03	0.13	39		887	48	393		DWR
		10-10-60	76	1480	7.5					0 0.00	384 6.30		188 5.30								408	93	DWR
Palos Verdes Water Company 78 Malago Avenue, Palos Verdes	4S/14W-36H1	3-24-60	77	757	7.7					0 0.00	336 5.50		85 2.40								98		DWR
		10-21-60	77	796	7.9					0 0.00	345 5.65		92 2.59								103	0	LEIN

a, b, c. See footnotes at end of Tables

ANALYSES OF GROUND WATER
1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
CENTRAL BASIN PRESSURE AREA (4-11.03)																							
City of Southgate	3S/13W- 2B1	12-20-60	69	952	7.5					0 / 0.00	268 / 4.40		66 / 1.85					None			360	140	DWR
		1-5-60		820	8.1	100.66 / 5.05	29.10 / 2.41	46.05 / 2.00		0 / 0.00	252 / 4.13	159.90 / 3.34	69.84 / 1.97			0.5	11.98	H_2S - Oppm	669		391.19		Smith-Emery
LOS ANGELES FOREBAY AREA (4-11.04)																							
City of Vernon	2S/13W-10P4	6-10-60	67	660	7.7	73 / 3.65	18 / 1.45	50 / 2.16	3.5 / 0.09	0 / 0.00	244 / 4.00	101 / 2.10	35 / 1.00	7.4 / 0.12	0.6 / 0.03	0.13	18		400	29	255		DWR
		12-30-60	68	645	7.9					0 / 0.00	254 / 4.16		33 / 0.93								253	45	DWR
Hobart Ice Plant	2S/13W-12K1	6-10-60	71	517	7.8					0 / 0.00	244 / 4.00		69 / 1.95								235	35	DWR
		12-30-60	68	677	8.0	58 / 2.90	26 / 2.10	47 / 2.06	3.1 / 0.08	0 / 0.00	241 / 3.95	62 / 1.30	62 / 1.75	1.2 / 0.02	0.4 / 0.02	0.07	29		371	29	250	53	DWR
Pioneer Paper Company	2S/13W-15N3	6-28-60	--	768	7.7	78 / 3.89	21 / 1.74	64 / 2.82	6.1 / 0.16	0 / 0.00	282 / 4.61	113 / 2.37	52 / 1.45	2.3 / 0.04	0.8 / 0.04	0.23	17		537	33	281	51	Lein
		12-19-60	66	677	7.6	76 / 3.78	22 / 1.82	45 / 1.95	3.6 / 0.09	0 / 0.00	244 / 4.00	111 / 2.32	38 / 1.05	1.9 / 0.03	0.4 / 0.02	0.22	18		486	26	280	80	Lein

a, b, c - See footnotes at end of Tables.

ANALYSES OF GROUND WATER

1960

Owner and use / Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents [a]	Total dissolved solids in ppm [b]	Percent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by [c]
						Mineral constituents in parts per million / equivalents per million																	
						MAIN SAN GABRIEL BASIN (4-13.01)																	
Baldwin Park County Water District	1S/10W-7A1	4-13-60	72	645	7.8					0 / 0.00	198 / 3.24		76 / 2.14								294		DWR
		9-13-60	69	681	8.3	88 / 4.4	20 / 1.8	32[d]		0 / 0.00	222 / 3.64	41.2 / 0.86	86 / 2.45	30 / 0.5				NH_4^+ - 0	519		303		LACo FCD
City of Glendora	1S/10W-10C1	4-13-60	68	637	7.7					0 / 0.00	244 / 4.00		17 / 0.48								288		DWR
		12-22-60	66	570	7.8	76 / 3.79	16 / 1.32	16 / 0.70	3.0 / 0.08	0 / 0.00	223 / 3.65	51 / 1.07	16 / 0.45	49 / 0.79	0.3 / 0.02	0.07	22		456	12	256	73	LEIN
Walnut Place Mutual Water Company	1S/10W-19N1	4-14-60		1087	7.8					0 / 0.00	249 / 4.08		80 / 2.26								388		DWR
		12-21-60		1040	7.5	103 / 5.13	27 / 2.18	76 / 3.30	6 / 0.15	0 / 0.00	191 / 3.13	227 / 4.73	93 / 2.63	29 / 0.47	0.2 / 0.01	0.12	11		816	31	366	109	Lein
City of Monrovia	1S/11W-2G1	4-18-60		585	7.6	74 / 3.72	18 / 1.54	16 / 0.70	1.5 / 0.04	0 / 0.00	258 / 4.24	54 / 1.12	20 / 0.56	0 / 0	0.33 / 0.05	0.04	20		403	17	263	51	Term
Southern California Water Company	1S/11W-10F1	4-18-60	62	405	7.7					0 / 0.00	204 / 3.35		9 / 0.25								175		DWR
		12-22-60	66		8.1	66 / 3.28	11 / 0.92	14 / 0.60	2.0 / 0.05	0 / 0.00	220 / 3.60	27 / 0.56	14 / 0.39	29 / 0.47	0.3 / 0.02	0.08	17		348	12	210	30	Lein
Herbert Mutual Water Company	1S/11W-14M1	4-18-60		413	8.0	57 / 2.84	12 / 0.98	9 / 0.42	2. / 0.08	0 / 0.00	199 / 3.26	16 / 0.35	14 / 0.38	22 / 0.35	0.29 / 0.02	0.04	12		310	10	191	28	Term
		12-22-60		420	7.9	63 / 3.15	12 / 1.03	8 / 0.34	2.9 / 0.07	0 / 0.00	198 / 3.25	24 / 0.51	13 / 0.36	19 / 0.31	0.1 / 0.01	0.04	14		350	7.4	209	46	Lein
San Gabriel Valley Water Company	1S/11W-26K1	12-21-60		483	8.2	70 / 3.48	10 / 0.75	19 / 0.82	3.5 / 0.09	0 / 0.00	222 / 3.63	38 / 0.80	16 / 0.44	19 / 0.30	0.02 / 0.01	0.08	17		336	16	212	30	Lein
Pedro Mireles	1S/11W-32C1	4-21-60		753	8.1					0 / 0.00	329 / 5.40		27 / 0.75								338		DWR
		12-21-60		780	8.2	116 / 5.80	23 / 1.92	18 / 0.8	2.8 / 0.07	0 / 0.00	346 / 5.66	71 / 1.48	31 / 0.87	31 / 0.5	0.2 / 0.01	0.12	18		570	9.3	386	103	Lein

ANALYSES OF GROUND WATER
1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						MAIN SAN GABRIEL BASIN (Continued)																	
Ed Alluis	1S/11W-33P1	4-21-60		885	7.8					0 / 0.00	336 / 5.50		39 / 1.10								430		DWR
		12-21-60		830	8.2					0 / 0.00	316 / 5.18		42 / 1.18								406	147	Lein

a, b, c, d See Footnotes at end of Tables

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
										LOWER MOJAVE RIVER VALLEY - BARSTOW TO YERMO (6-40)													
Union Pacific Railroad	9N/1E- 1M1	3-30-60		438	7.8					0/0.00	180/2.95		28/0.80								120	0	DWR
		8-25-60		462	7.4	59/1.95	6/0.45	58/2.50	3.1/0.08	0/0.00	189/3.10	41/0.86	13/0.89	1.6/0.03	0.5/0.03	.10	24		266	50	120	0	Lein
		12-16-60	70	455	7.5					0/0.00	190/3.12		29/0.82								127	0	Lein
Grey Phelps Cool Water Ranch	9N/1E-15N2	3-30-60		926	7.5					0/0.00	278/4.56		82/2.31					PO_4-0.2			262		DWR
		4- 5-60			7.5							96/2.00	132/3.75				25	Fe-0.6	567		246		Nalco
		8-25-60		1071	7.6	57/2.86	43/3.53	104/4.50	2.0/0.05	0/0.00	291/4.77	151/3.15	99/2.79	6.0/0.09	0.4/0.02	0.37	20		646	41	320	81	Lein
		12-16-60		990	7.5	90/4.49	16/1.29	111/4.83	3.6/0.09	0/0.00	317/5.20	134/2.78	91/2.56	5.5/0.09	0.3/0.02	0.51	20		696	45	289	29	Lein
Stuart C. Slack	9N/2E- 8N2	3-30-60		394	7.9	31/1.55	7/0.58	44/1.91	1.6/0.04	0/0.00	168/2.76	33/0.69	21/0.59	3.5/0.06	0.6/0.03	0.06	23		225	47	108		DWR
		3- 2-60		411	7.6	34/1.70	7/0.58	45/1.96	1.0/0.03	0/0.00	181/2.96	33/0.69	22/0.62	0.2/0.003	0.7/0.04	0.08			234	46	114	0	S.B.Co. F.C.D.
		8-25-60	68	415	6.8	28/1.40	11/0.85	46/2.00	1.6/0.04	0/0.00	167/2.74	36/0.74	34/0.95	1/0.02	0.06/0.03	0.05	14		266	46	113	0	Lein
		12-16-60	68	329	7.6	24/1.21	6/0.54	37/1.60	1.3/0.03	0/0.00	147/2.92	24/0.50	14/0.40	1.4/0.02	0.6/0.03	0.17	18		190	47	88	0	Lein
Southern California Water Company	9N/1W- 5J3	3-30-60		630	7.9	52/2.59	9/0.74	69/3.00	2.2/0.06	0/0.00	176/2.88	107/2.23	44/1.24	0.5/0.01	0.93/0.05	0.42	14		390	47	168		DWR
V. B. Price	9N/1W- 9G1	3- 2-60		1066	7.8	69/3.44	25/2.06	118/5.13	3.6/0.09	0/0.00	342/5.60	94/1.96	96/2.71	0.7/0.01	0.7/0.04	1.18			655	48	274	0	S.B.Co. F.C.D.

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						LOWER MOJAVE RIVER VALLEY - BARSTOW TO YERMO (Continued)																	
V. B. Price	9N/1W- 9G1	3-30-60	70	1183	7.3	114 5.69	25 2.06	118 5.13	3.6 0.09	0 0.00	493 8.08	98 2.04	95 2.68	0 0.00	0.8 0.04	1.2	23		735	40	388		DWR
		12-16-60	67	1150	7.6					0 0.00	480 7.87		106 2.99								396	3	Lein
KBOO	9N/1W-10D2	3- 3-60		533	8.3	47 2.35	9 0.74	56 2.43	2.6 0.07	14 0.48	168 2.76	62 1.29	40 1.13	0.3 0.005	0.6 0.03	0.09			308	44	154	0	S.B.Co. F.C.D.
		8-24-60	68	561	7.4	49 2.46	11 .86	61 2.64	1.6 0.04	0 0.00	198 3.25	70 1.46	40 1.13	0 0.00	0.5 0.03	0.10	16		374	44	166	3	Lein
Lee Tippet	9N/1W-10G1	3-30-60		1357	7.3					0 0.00	405 6.64		82 2.31								366		DWR
		8-25-60		1351	7.5					0 0.00	404 6.61		86 2.43								359		
Cal. Elec. Power Co.	9N/1W-13H2	3-30-60	64	782	7.8	62 3.09	10 0.82	91 3.96	2.4 0.06	0 0.00	207 3.40	112 2.33	72 2.03	1.0* 0.02	0.7 0.04	0.36	21	PO_4-0.4	470	50	196		DWR
		12-16-60	67	885	8.0	69 3.47	10 0.82	100 4.35	3.5 0.09	0 0.00	231 3.78	144 2.99	72 2.02	0.9 0.02	0.6 0.03	0.66	20		618	50	215	26	Lein
State Department of Agriculture	10N/2E-31R1	3- 3-60		475	7.9	31 1.55	7 0.58	60 2.61	0.6 0.02	0 0.00	183 3.00	43 0.90	31 0.87	1.8 0.03	0.7 0.04	0.22			265	55	108	0	S.B.Co. F.C.D.
R. W. Dickenson	10N/1W-32J1	3- 3-60		724	8.0	62 3.09	13 1.07	74 3.22	3.0 0.08	0 0.00	251 4.12	69 1.44	57 1.61	0.2 0.003	0.6 0.03	0.09			435	43	206	0	S.B.Co. F.C.D.
		3-29-60	69	710	7.4	62 3.09	12 0.99	78 3.39	3.0 0.08	0 0.00	244 4.00	103 2.14	47 1.33	1.0 0.02	0.6 0.03	0.12	24		430	45	202		DWR
		8-24-60		709	7.8					0 0.00	253 4.15		52 1.45								202		Lein
		12-16-60		698	7.6					0.00 0.00	243 3.98		50 1.41								194	0	Lein

* NO_3 as N. a,b,c, see footnotes at end of tables

ANALYSES OF GROUND WATER

1960

Mineral constituents in parts per million / equivalents per million

Owner and use / Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25° C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
										COACHELLA VALLEY-SOUTH (7-21)													
Lester Roberson	5S/7E-16K1	6- 2-60		314	8.4	33 / 1.65	9 / 0.77	19 / 0.11	4.3 / 0.11	3 / 0.11	148 / 2.42	2.8 / 0.59	10 / 0.28	0 / 0	0.7 / 0.04	0	15		[illegible]	25	121	0	Lein
		12-21-60		294	7.8					0 / 0.00	159 / 2.60		8 / 0.23								111	0	DWR
Z. E. Zalay	5S/7E-22K1	6- 1-60	71	761	7.3					0 / 0.00	137 / 2.25		71 / 2.0								338		DWR
		12-21-60	72	827	7.6	116 / 5.79	16 / 1.32	43 / 1.87	6.2 / 0.16	0 / 0.00	173 / 2.84	194 / 4.04	77 / 2.17	6.8 / 0.11	0.6 / 0.03	0.14	24		643	20	355	213	DWR
J. N. Rameriz	5S/7E-33C1	6- 1-60		1480	7.8	186 / 9.27	24 / 1.95	85 / 3.70	8.2 / 0.21	0 / 0.00	144 / 2.36	346 / 7.20	136 / 3.84	88 / 1.42	0.4 / 0.02	0	16		1162	24	561	443	Lein
		12-21-60		1720	7.4	240 / 11.98	26 / 2.14	104 / 4.52	9 / 0.23	0 / 0.00	183 / 3.00	459 / 9.57	152 / 4.29	106 / 1.71	0.5 / 0.03	0.22	25		1286	24	706	556	DWR
Mitchel Land and Improvement Company	5S/8E-31D1	6- 1-60		670	7.2	92 / 4.60	8 / 0.65	45 / 1.95	3.1 / 0.08	0 / 0.00	134 / 2.20	149 / 3.10	55 / 1.55	19 / 0.30	0.6 / 0.03	0.01	23		452	27	263	153	DWR
		12-21-60		581	7.5	76 / 3.79	7 / 0.61	40 / 1.74	5.2 / 0.13	0 / 0.00	149 / 2.44	114 / 2.37	48 / 1.35	10 / 0.16	0.6 / 0.03	0.17	23		415	28	220	98	DWR
E. M. Holm	5S/8E-33N1	6- 2-60		610	8.4					0 / 0.00	137 / 2.24		27 / 0.77								81	0	Lein
		12-21-60		581	7.3					0 / 0.00	142 / 2.32		27 / 0.76								82	0	DWR
G. Phillips	6S/7E-25E1	6- 1-60		663	8.1	52 / 2.62	8 / 0.66	61 / 2.65	3.9 / 0.10	0 / 0.00	99 / 1.62	110 / 2.30	77 / 2.17	0.7 / 0.01	0.6 / 0.03	0	14		433	44	164	83	Lein
		8-19-60		1395	7.6	135 / 6.75	13 / 1.05	123 / 5.37	5.1 / 0.13	0 / 0.00	104 / 1.70	270 / 5.63	191 / 5.40	6.9 / 0.11	0.6 / 0.03	0.04	20		837	40	390	305	DWR
M. R. Shepard	6S/8E- 7P1	6- 1-60		488	8.3	51 / 2.56	6 / 0.52	34 / 1.46	3.5 / 0.09	2.3 / 0.08	123 / 2.01	64 / 1.33	46 / 1.30	0.7 / 0.01	0.5 / 0.03	0	15		332	32	154	49	Lein
		12-21-60		464	7.6					0 / 0.00	132 / 2.16		44 / 1.24								158	50	DWR
E. H. McCain	6S/8E-10A4*	6- 2-60		451	8.1					0 / 0.00	98 / 1.60		36 / 1.01								54	0	Lein

a, b, c, See Footnotes at end of Tables

ANALYSES OF GROUND WATER
1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
COACHELLA VALLEY-SOUTH (continued)																							
E. H. McCain	6S/8E-10A4*	12-21-60	76	483	6.8	20/1.00	0/0	76/3.31	1.8/0.05	0/0.00	73/1.20	77/1.61	56/1.58	0.7/0.01	5.9/0.31	0.34	20		296	76	49	0	DWR
J. E. Stroube	6S/8E-27H1	6- 2-60		230	8.1	12/0.58	2.2/0.18	32/1.40	1.9/0.05	0/0.00	85/1.40	30/0.62	9/0.25	0/0	0.4/0.02	0	12		193	63	38	0	Lein
		12-21-60		226	8.3	14/0.70	0/0	36/1.57	22/0.06	10/0.32	71/1.16	28/0.59	9/0.25	0.7/0.01	0.8/0.04	0.14	17		147	67	36	0	DWR
N. Karahadian	6S/9E-30C1	6- 2-60		272	8.1					0/0.00	85/1.40		10/0.28								26	0	Lein
		12-21-60		274	8.5					7.2/0.24	78/1.28		10/0.28								18	0	DWR
Vessey Brothers	7S/8E-22M1	6- 1-60		1870	7.2	134/6.69	12/0.99	201/8.75	3.9/0.10	0/0.00	22/0.36	272/5.67	378/10.66	1.2/0.02	0.4/0.02	0	14		1281	53	384	366	Lein
		12-21-60		1980	7.7					0/0.00	24/0.40		426/12.01								413	393	DWR
C. C. Crockett	7S/9E-16K1	6- 1-60		1035	8.4	14/0.70	2/0.15	183/7.95	3.9/0.10	6/0.20	220/3.60	127/2.65	83/2.35	4.7/0.08	5.5/0.29	0.35	17		552	89	43	0	DWR
		12-21-60		887	8.3	8/0.40	2/0.16	182/7.92	0.8/0.02	10/0.32	217/3.56	108/2.24	79/2.23	2.1/0.03	6.1/0.31	0.46	15		535	93	29	0	DWR

*6S/8E-10A3 has been changed to -10A4 a, b, c See Footnotes at end of Tablee

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25° C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents[a]	Total dissolved solids in ppm[b]	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by[c]
						Mineral constituents in parts per million / equivalents per million																	
						ANAHEIM BASIN PRESSURE AREA (8-1.01)																	
C. C. Stedman	5S/11W-21M3	3-29-60	--	370	8.0					6 0.20	143 2.34	31 0.65	12 0.34										OCDA
		9-12-60	77	396	8.4					4 0.13	156 2.56		12 0.34										OCDA
Anderson Mutual Water Company	5S/11W-21N2	3-29-60	77	589	7.9	66 3.30	6 0.50	60 2.61	3.5 0.09	0 0.00	205 3.36	102 2.13	20 0.56			0			348	40	190	22	OCDA
		9- 6-60	77	616	7.7					0 0.00	177 2.90		19 0.54										OCDA
Harry C. Fulton	5S/11W-25R2	5-26-60	77	726	7.7					0 0.00	320 5.25	91 1.90	39 1.10										OCDA
		9-27-60	77	840	7.7	84 4.24	35 2.92	35 1.52	5.3 0.14	0 0.00	366 6.00	87 1.81	39 1.10			1.0			505	17			OCDA
W. S. Tubach	5S/11W-27H4	4-28-60	77	2606	7.8					0 0.00	296 4.85	200 4.17	474 13.37										OCDA
		9- 6-60	77	2785	7.5						303 4.97		426 6.98										OCDA
Callens Brothers	5S/11W-28H2	1-28-60		350	7.5			78 3.40			201 3.30		14 0.40	1 0.01		0.1					25		UCR
		5-17-60		362	7.9					0 0.00	189 3.10	24 0.50	20 0.56										OCDA
		9-12-60		438	8.2					0 0.00	185 3.20		23 0.64										OCDA
Bolsa Land Company	5S/11W-28K1	5-17-60	77	535	8.3					10 0.33	268 4.39	3 0.06	19 0.54										OCDA
		9-12-60	77	535	8.6					8 0.27	282 4.62		19 0.54										OCDA
Sunset Land and Water Company	5S/11W-29C1	5-17-60		354	8.7	7 0.35	24 0.20	54 2.39	2 0.05	7 0.23	146 2.39	8 0.17	6.6 0.14	0 0.00		0			189	80	28	0	OCDA
		6- 7-60		325	8.6	10 0.50	1 0.05	66 2.87	1.2 0.03	6 0.20	149 2.45	8 0.17	16 0.45	2.5 0.04	0.5 0.03	0.09	17		178	83	28	0	DWR

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents[a]	Total dissolved solids in ppm[b]	Percent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by[c]
						Mineral constituents in parts per million / equivalents per million																	
ANAHEIM BASIN PRESSURE AREA (continued)																							
Sunset Land and Water Company (continued)	5S/11W-29C1	9-14-60	77	363	8.6	10/0.48	1/0.04	60/2.61	16/0.39	7/0.23	146/2.39	8/0.17	22/0.62			0				74			OCDA
Signal Oil and Gas Company	5S/11W-33H1	5-17-60		388	8.3					7/0.23	176/2.89	2/0.04	13/0.37										OCDA
		9-14-60		473	7.1	10/0.50	1/0.08	74/3.22	1.6/0.04	0/0.00	182/2.98	2/0.05	29/0.82			0			254	84	29	0	OCDA
Signal Oil and Gas Company	5S/11W-34F3	5-17-60	77	656	8.4					14/0.47	337/5.52	1/0.02	14/0.39										OCDA
		9-14-60	77	656	8.5					11/0.37	354/5.80		18/0.51										OCDA
Joseph J. Courreges	5S/11W-36B2	5-25-60	77	460	7.8	58/2.90	5/0.38	24/1.04	4.5/0.12	0/0.00	198/3.24	33.6/0.70	19/0.54						345				OCDA
		9-22-60	77	496	7.7					0/0.00	210/3.44		20/0.56										OCDA
Ivan Harper	5S/11W-36P1	3-29-60	77	2079	7.6					0/0.00	198/3.25	48/1.00	466/13.14										OCDA
		10-12-60	77	2573	7.4	280/14.00	77/6.42	78/3.39	7/0.18	0/0.00	196/3.21	53/1.10	684/19.29			0			1448	14			OCDA
I. W. Hellman Ranch	5S/12W-12C1	5-25-60	77	346	8.3					7/0.23	134/2.20	14/0.39	12/0.34										OCDA
		9-21-60	77	328	8.5					5/0.17	128/2.10		13/0.37										OCDA
Robert Gisler	6S/10W-5C1	6-29-60		716	7.8					0/0.00	271/4.46	82/1.71	35/0.99										OCDA
		10-26-60		847	7.9	43/2.15	17/1.42	81/3.50	3/0.09	0/0.00	244/4.00	82/1.70	54/1.52			0.05			383	49	179	0	OCDA
William Lamb	6S/10W-6B2	5-17-60	77	484	7.9					0/0.00	212/3.48	44/0.92	17/0.48										OCDA
		9-27-60	77	513	7.8					0/0.00	212/3.48		19/0.54										OCDA

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per-cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						ANAHEIM BASIN PRESSURE AREA (continued)																	
Walter Lamb	6S/10W-6H2	5-10-60	77	535	8.2					0 / 0.00	242 / 3.97	35 / 0.73	24 / 0.68										OCDA
		10-18-60	77	549	7.5						237 / 3.89		29 / 0.82										OCDA
H. J. Lamb	6S/10W-6L2	5-17-60	77	9231	7.1					0 / 0.00	353 / 5.79	2 / 0.04	3184 / 89.79										OCDA
		10-18-60	77	9774	6.7						398 / 6.52		2996 / 84.49										OCDA
Jim Bushard	6S/10W-7D3	5-10-60	77	8236	7.8					0 / 0.00	310 / 5.08	1 / 0.02	2819 / 79.50										OCDA
		10-11-60	77	8839	7.2	680 / 34.00	139 / 11.58	940 / 40.87	23 / 0.58	0 / 0.00	368 / 6.03	1 / 0.02	2894 / 81.61			0.05			5518	47			OCDA
E. H. Gisler	6S/10W-18B4	5-26-60	77	5350	7.8					0 / 0.00	271 / 4.44	3 / 0.06	1656 / 46.70										OCDA
		10-26-60	77	5809	9.5					0 / 0.00	273 / 4.48		1770 / 49.92										OCDA
Anaheim Sugar Company	6S/11W-1B1	5-26-60		847	8.0	99 / 4.95	18 / 1.50	46 / 2.00	5 / 0.13	0 / 0.00	207 / 3.39	66 / 1.37	146 / 4.11						589	23	323	153	OCDA
Urbain Plavan	6S/11W-1J3	5-10-60	77	5647	7.7	628 / 31.40	118 / 9.80	240 / 10.43	12 / 0.30	0 / 0.00	169 / 2.77	169 / 3.52	1553 / 43.80	0 / 0					3664	20			OCDA
		10-18-60	77	6732	7.4	816 / 40.80	124 / 10.33	430 / 18.70	17 / 0.44	0 / 0.00	148 / 2.43	252 / 5.25	2125 / 59.93			0.26			4268	27			OCDA
Huntington Beach Golf Course	6S/11W-3R2	5-17-60	77	337	7.8					0 / 0.00	171 / 2.80	10 / 0.21	28 / 0.79										OCDA
		9-14-60	77		7.9	49 / 2.45	17 / 1.42	232 / 10.09	8 / 0.20	0 / 0.00	315 / 5.16	99 / 2.06	254 / 7.16						718	71	194	0	OCDA
Wilshire Oil Company	6S/11W-13F4	5-26-60		14521	7.9	335 / 16.75	339 / 28.25	2300 / 100.0	3.5 / 0.09	0 / 0.00	253 / 4.15	392 / 8.17	4446 / 125.3						10214	69	2250	2035	OCDA
		10-26-60		9241	7.8	684 / 34.20	214 / 17.83	810 / 35.22	3 / 0.8	0 / 0.00	290 / 4.75	3 / 0.06	2876 / 81.11			0.63			6128	40	2601	2363	OCDA

a, b, c. See footnotes at end of tables.

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
								CHINO BASIN (8-2.01)															
S. & S. Ranch	1S/6W-29R1	5-20-60		414	8.1	56 / 2.79	5 / 0.41	24 / 1.04	1.6 / 0.04	0 / 0.00	198 / 3.24	5 / 0.10	23 / 0.65	18 / 0.29	0.2 / 0.01	0			258	24	161	0	S.B.Co. F.C.D.
		10-13-60		401	7.9	58 / 2.89	4 / 0.33	26 / 1.13	1.8 / 0.05	0 / 0.00	200 / 3.28	6 / 0.12	23 / 0.65	18 / 0.29	0.1 / 0.01	0.09			267	26	163	0	S.B.Co. F.C.D.
Peach Park Water Company	1S/7W-28R1	5-24-60		365	7.6	46 / 2.30	10 / 0.82	16 / 0.70	0.4 / 0.01	0 / 0.00	178 / 2.92	12 / 0.25	13 / 0.37	14 / 0.23	0.5 / 0.03	0.04			215	18	156	10	S.B.Co. F.C.D.
Wilder & Camel	1S/7W-34M1	10-13-60		376	7.5	50 / 2.50	10 / 0.82	18 / 0.78	1.1 / 0.03	0 / 0.00	203 / 3.32	11 / 0.23	12 / 0.34	15 / 0.25	0.4 / 0.02	0			257	19	165	0	S.B.Co. F.C.D.
P. J. Crerolim	2S/7W-10M1	5-17-60		648	7.7	72 / 3.59	24 / 1.97	23 / 1.00	1.6 / 0.04	0 / 0.00	239 / 3.92	26 / 0.54	44 / 1.24	56 / 0.90	0.4 / 0.02	0			393	15	278	82	S.B.Co. F.C.D.
		10-13-60		655	7.5	83 / 4.14	22 / 1.81	23 / 1.00	1.7 / 0.04	0 / 0.00	247 / 4.04	27 / 0.56	48 / 1.35	62 / 1.00	0.4 / 0.02	0			423	14	298	96	S.B.Co. F.C.D.
		12-13-60		413	7.7	51 / 2.54	13 / 1.07	19 / 0.83	1.1 / 0.03	0 / 0.00	198 / 3.24	14 / 0.29	20 / 0.56	22 / 0.36	0.4 / 0.02	0.03			268	19	181	19	--
Pietro Enrico Domenico Enrico	2S/7W-15A1	5-17-60		344	7.6	41 / 2.05	9 / 0.74	18 / 0.78	1.6 / 0.04	0 / 0.00	188 / 3.08	14 / 0.29	7 / 0.20	6 / 0.09	0.1 / 0.01	0			226	22	140	0	S.B.Co. F.C.D.
		10-13-60		331	7.8	41 / 2.05	9 / 0.74	20 / 0.87	1.7 / 0.04	0 / 0.00	195 / 3.20	13 / 0.27	6 / 0.17	3 / 0.05	0.2 / 0.01	0.06			224	24	140	0	S.B.Co. F.C.D.
		12-13-60		330	7.7	44 / 2.20	8 / 0.66	18 / 0.78	1.7 / 0.04	0 / 0.00	193 / 3.16	11 / 0.23	7 / 0.20	4 / 0.06	0.1 / 0.01	0			210	21	143	0	S.B.Co. F.C.D.
C. T. Merrill	2S/7W-21L1	5-17-60		818	7.7	96 / 4.79	29 / 2.38	34 / 1.48	2.3 / 0.06	0 / 0.00	330 / 5.40	59 / 1.23	32 / 0.90	70 / 1.14	0.4 / 0.02	0			526	17	358	88	S.B.Co. F.C.D.
		10-13-60		744	7.8	95 / 4.74	26 / 2.14	32 / 1.39	2.3 / 0.06	0 / 0.00	320 / 5.24	53 / 1.10	31 / 0.87	65 / 1.04	0.3 / 0.02	0.12			492	17	347	85	S.B.Co. F.C.D.
		12-13-60		726	7.8	94 / 4.69	24 / 1.97	30 / 1.30	2 / 0.05	0 / 0.00	315 / 5.16	49 / 1.02	31 / 0.87	64 / 1.04	0.2 / 0.01	0.02			469	16	335	77	S.B.Co. F.C.D.
A. Omlin	2S/7W-23E1	5-17-60		809	7.4	102 / 5.09	27 / 2.22	30 / 1.30	1.4 / 0.04	0 / 0.00	361 / 5.92	39 / 0.81	37 / 1.04	50 / 0.81	0.3 / 0.02	0			480	15	365	69	S.B.Co. F.C.D.
		10-13-60		756	7.5	104 / 5.19	25 / 2.06	30 / 1.30	2 / 0.05	0 / 0.00	351 / 5.76	39 / 0.81	37 / 1.04	48 / 0.77	0.3 / 0.02	0.06			490	15	361	73	S.B.Co. F.C.D.

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						CHINO BASIN (Continued																	
A. Umlin	2S/7W-23E1	12-13-60		779	7.4	104 / 5.19	27 / 2.22	30 / 1.30	2 / 0.05	0 / 0.00	356 / 5.84	37 / 0.77	42 / 1.18	52 / 0.84	0.3 / 0.02	0			483	15	369	77	S.B.Co. F.C.D.
Luginbill and Imbach	2S/7W-27A1	5-17-60		1076	7.4	127 / 6.34	36 / 2.96	60 / 2.61	2 / 0.05	0 / 0.00	525 / 8.60	57 / 1.19	56 / 1.58	40 / 0.64	0.3 / 0.02	0			670	22	464	34	S.B.Co. F.C.D.
		6-6-60		1060	7.7					0 / 0.00	522 / 8.55		57 / 1.60								465		DWR
		10-13-60		998	7.4	129 / 6.44	34 / 2.80	60 / 2.61	2.3 / 0.06	0 / 0.00	530 / 8.68	53 / 1.10	51 / 1.44	36 / 0.59	0.3 / 0.02	0			664	22	461	27	S.B.CO. F.C.D.
		12-13-60		969	7.5	123 / 6.14	31 / 2.55	59 / 2.57	2.2 / 0.06	0 / 0.00	525 / 8.60	44 / 0.92	48 / 1.35	32 / 0.52	0.3 / 0.02	0.03			628	23	435	5	S.B.Co. F.C.D.
		12-22-60		965	8.0					0 / 0.00	516 / 8.47		46 / 1.28								428	4	Lein

a, b, c See Footnotes at end of Tables

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25° C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
BUNKER HILL BASIN (8-2.06)																							
Delman Water Company	1N/4W-29E1	4-1-60		503	7.4	57/2.84	22/1.84	18/0.78	3/0.08	0/0.00	237/3.88	53/1.10	11/0.31	5/0.08	0.5/0.03	0	21		332	14	234	40	DWR
		6-21-60		610	6.2					0/0.00	241/3.95		12/0.35								313	115	DWR
		9-7-60		606	7.7	92/4.59	18/1.48	17/0.74	4/0.10	0/0.00	254/4.16	100/2.08	12/0.34	17/0.27	0.5/0.03	0.22			417	11	306	98	S.B.Co. F.C.D.
		9-22-60		620	8.2	91/4.55	19/1.55	12/0.54	3/0.08	0/0.00	247/4.05	96/2.00	11/0.30	19/0.31	0.6/0.03	0.11	22		392	8	305	103	DWR
Delman Water Company	1N/4W-29F1	3-30-60	65	1,000	7.9	162/8.10	30/2.50	17/0.72	5/0.13	0/0.00	256/4.20	313/6.51	18/0.50	23/0.37	0.6/0.03	0.14	19		739	6	530	320	DWR
		9-22-60		787	7.8	152/7.60	35/2.90	11/0.47	3.5/0.09	0/0.00	220/3.60	305/6.34	18/0.50	19/0.30	0.7/0.04	0.16	23		705	4	525	345	DWR
Tri-City Rock Company	1S/3W-9E2	3-31-60	64	342	8.1	29/1.45	15/1.21	20/0.87	2.8/0.07	0/0.00	161/2.64	13/0.28	15/0.42	4/0.06	0.3/0.02	0.63	28		229	24	133		DWR
		8-15-60																ABS-0.04 ppm PO_4-0.06ppm					
		9-22-60		257	7.8	31/1.55	5/0.45	15/0.66	2/0.05	0/0.00	128/2.10	6/0.13	11/0.30	5.6/0.09	0.4/0.02	0.17	25		155	24	100	0	DWR
Cook Orchards	1S/3W-16A1	4-1-60		289	7.4	24/1.20	13/1.04	18/0.78	1.5/0.04	0/0.00	135/2.22	19/0.40	7/0.20	3.8/0.06	0.4/0.02	0	28		195	25	112		DWR
		9-22-60		263	7.9	32/1.60	7/0.55	14/0.62	1.2/0.03	0/0.00	131/2.15	17/0.36	4/0.10	3/0.05	0.3/0.02	0.02	28		166	22	108	0	DWR
Mesbur Realty Company	1S/4W-13F3	3-31-60	64	344	7.6	35/1.75	14/1.13	14/0.61	2.4/0.06	0/0.00	159/2.60	24/0.49	11/0.31	6/0.10	0.5/0.02	0.17	19		212	17	144		DWR
		9-22-60		388	7.6	55/2.75	9/0.75	11/0.49	2.3/0.06	0/0.00	171/2.80	43/0.90	9/0.25	9/0.14	0.5/0.03	0.10	19		247	12	175	35	DWR

ANALYSES OF GROUND WATER
1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents[a]	Total dissolved solids in ppm[b]	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ NC ppm	Analyzed by[c]
						Mineral constituents in parts per million / equivalents per million																	
						BUNKER HILL BASIN (Continued)																	
Gage Canal Company	1S/4W-13G2*	3-31-60	60	329	7.7	38 / 1.90	11 / 0.90	15 / 0.65	1.8 / 0.05	0 / 0.00	154 / 2.52	18 / 0.38	12 / 0.34	6 / 0.09	0.5 / 0.02	0.18	23		200	19	140		DWR
		9-22-60		367	8.0	50 / 2.50	8 / 0.65	12 / 0.53	20 / 0.05	0 / 0.00	162 / 2.65	27 / 0.57	11 / 0.30	10 / 0.16	0.5 / 0.03	0.13	21		216	14	158	25	DWR
		10-6-60		358	7.9	48 / 2.40	4 / 0.33	14 / 0.61	1 / 0.03	0 / 0.00	168 / 2.75	15 / 0.31	14 / 0.40	5 / 0.08	0.3	0.4		PO_4-0.6	185	18	137		Babcock
	1S/4W-13L1	3-31-60	61	319	7.7	46 / 2.30	5 / 0.42	15 / 0.65	1.8 / 0.05	0 / 0.00	148 / 2.42	23 / 0.47	6 / 0.17	11 / 0.18	0.6 / 0.03	0	22		194	19	136	15	DWR

*Changed from -13G1 a,b,c, see footnotes at end of tables

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25° C)	pH	Mineral constituents in parts per million / equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
MISSION BASIN, SAN LUIS REY VALLEY (9-7.01)																							
George Nagata	11S/4W- 4N1	2-9-60	67	1471	7.3	122 6.09	46 3.81	108 4.70	6 0.15	0 0.00	337 5.52	105 2.19	221 6.23	33 0.53	0.4 0.02	0.08	41	ABS-0	858	32	495		DWR
		12-5-60		1499	7.5	148 7.39	37 3.04	120 5.22	6.4 0.16	0 0.00	325 5.32	117 2.43	256 7.22	44 0.71	0.4 0.02								DWR
Mrs. K. Johnson	11S/4W- 5K1	2-10-60	68	1855	7.4	163 8.13	59 4.83	108 4.70	7.1 0.18	0 0.00	242 3.96	78 1.63	420 11.84	0.4 0.01	0.4 0.02	0.08	36		1271	26	648		DWR
		11-10-60		1760	7.4	158 7.88	55 4.52	107 4.65		0 0.00	244 4.00	124 2.58	420 11.84	0.02 0.00	0.4 0.02				1100				James
Stokes Brothers	11S/4W- 5R1	2-10-60		1059	7.4	78 3.89	31 2.59	94 4.09	5.4 0.14	0 0.00	292 4.78	84 1.75	138 3.89	6.7 0.11	0.4 0.02	0.08	30		601	38	324		DWR
J. S. Alvarado	11S/4W- 8H1	2-9-60	68	2546	7.6	173 8.63	73 6.01	263 11.44	7.4 0.19	0 0.00	365 5.98	312 6.49	480 13.54	0 0.00	0.7 0.04	0.07	33		1569	44	732		DWR
		12-5-60		2243	7.7					0 0.00	368 6.04		422 11.90								666	364	DWR
Academy of the Little Flower	11S/4W- 8J1	2-9-60	68	2613	7.8	170 8.48	66 5.42	280 12.18	5.8 0.15	0 0.00	327 5.36	210 4.38	570 16.07	12 0.19	0.5 0.03	0.16	30		1677	46	695		DWR
		12-5-60		2655	7.4					0 0.00	354 5.80		620 17.48								752	462	DWR
Clarence Nishizu	11S/4W- 8N1	2-10-60		2755	7.5	204 10.18	67 5.51	286 12.44	3.2 0.08	0 0.00	303 4.96	212 4.41	672 18.95	0.5 0.01	0.6 0.03	0.35	24		1855	44	784		DWR
		12-5-60		2821	7.6					0 0.00	322 5.28		712 20.08								833	569	DWR
S. Davies	11S/4W-18C1	3-8-60		1568	7.4	116 5.78	34 2.82	166 7.20	7 0.19	0 0.00	274 4.50	160 3.35	301 8.48	0 0.00	0.16 0.01	0.20	26		1075	45	430	205	TERM
		11-22-60		1330	7.1	116 5.79	44 3.62	113 4.91		0 0.00	306 5.01	232 4.83	215 6.06	0.03 0	0.48 0.02	0			944	34			James
		12-5-60		1342	7.8					0 0.00	281 4.60		240 6.77								389	159	DWR

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
						MISSION BASIN, SAN LUIS REY VALLEY (Continued)																	
Carlsbad Mutual Water Co.	11S/4W-18C9	8-26-60	70	1952	7.3	171 8.54	60 4.88	206 8.95	9.0 0.23	0 0.00	295 4.84	427 8.91	304 8.58	0 0.00	0.3 0.01	0.30	29		1400	40	671	430	LEIN
City of Oceanside	11S/4W-18L3	2-10-60	67	2330	7.3	202 10.10	72 5.90	236 10.25	8 0.20	0 0.00	351 5.75	476 9.91	355 10.00	2.2 0.04	1.0 0.05	0.03	35		1607	39	800	615	DWR
		9-29-60		2440	7.4	204 10.18	75 6.22	215 9.35	9 0.23	0 0.00	378 6.20	515 10.72	327 9.22	0 0.00	0.3 0.01	0.38	23		1738	36	821	511	LEIN
Carlsbad Mutual Water Co.	11S/4W-18L4	2-9-60	69	1588	7.3	117 5.84	48 3.92	145 6.31	6 0.17	0 0.00	312 5.12	213 4.43	236 6.66	0 0.00	0.5 0.02	0.06	30		985	39	488		DWR
Amsler	11S/5W-13L1	2-9-60		2360	7.4	202 10.10	100 8.20	195 8.50	7.4 0.19	0 0.00	323 5.30	379 7.88	468 13.20	3.2 0.05	0.7 0.04	0.08	36		1580	31	915		DWR
		12-5-60		2450	7.8					0 0.00	327 5.36		470 13.25								873	605	DWR
City of Oceanside	11S/5W-13Q1	2-9-60	67	4620	7.1	383 19.10	146 12.00	347 15.10	11 0.27	0 0.00	287 4.70	245 5.10	1298 36.60	3.1 0.05	0.6 0.03	0.07	32		3355	32	1555	1320	DWR

a, b, c, see footnotes at end of tables.

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other Constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
								EL CAJON VALLEY (9-16)															
R. Q. Alexander	15S/1E-31R1	4-11-60		1443	7.0	71 3.54	43 3.53	172 7.48	3 0.07	0 0.00	220 3.60	157 3.27	218 6.15	85 1.37	0.8 0.04	0.10	52		920	51	352		DWR
		12- 7-60		1200	7.3	54 2.69	37 3.04	144 6.26	3 0.07	0 0.00	181 2.96	125 2.60	191 5.39	68e 1.10	0.8 0.04	0.10	44		710	52	286	138	DWR
Jack Graves	16S/1W- 1Q1	4-11-60		1953	7.1					0 0.00	300 4.92		220 6.20								688		DWR
		12- 7-60		1893	7.1					0 0.00	290 4.76		215 6.06								671	433	DWR
Bob Olib	16S/1W- 2K6	4-11-60		1896	7.4	109 5.44	59 4.88	188 8.18	1.5 0.04	0 0.00	267 4.38	136 2.84	360 10.15	72 1.16	0.4 0.02	0.08	32		1200	44	516		DWR
		12- 7-60		2005	7.3					0 0.00	277 4.54		398 11.22								567	340	DWR
City of El Cajon	16S/1W- 3C2	4-12-60		1783	7.6					0 0.00	173 2.84		434 12.24								380		DWR
		12- 7-60		1777	7.6					0 0.00	178 2.92		448 12.63								392	246	DWR
Ed Fletcher Co.	16S/1W-10D1	4-12-60	74	1372	7.9	62 3.09	29 2.37	166 7.22	4.5 0.11	0 0.00	168 2.76	42 0.88	312 8.80	10 0.16	0.5 0.03	0.19	21		818	56	273		DWR
		9- 6-60	80	1330	8.2					0 0.00	159 2.60		304 8.57								247	117	Lein
J. M. Conaway	16S/1W-11P4	4-11-60		3378	7.3					0 0.00	359 5.88		750 21.15								828		DWR
		12- 7-60		2937	7.7	151 7.53	76 6.25	370 16.10	2.6 0.07	0 0.00	312 5.12	150 3.13	682 19.23	171e 2.76	0.8 0.04	0.28	54		1830	54	689	433	DWR
R. S. Embleton	16S/1W-15K2	4-11-60		3830	7.0	120 6.00	107 8.80	559 24.31	5 0.12	0 0.00	591 9.68	274 5.71	852 23.99	32 0.51	0.66 0.03	0	70		2640	62	740	256	Term
		12- 7-60		3759	7.4					0 0.00	622 10.20		805 22.70								743	233	DWR

a, b, c, e, See footnotes at end of tables.

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents[a]	Total dissolved solids in ppm[b]	Percent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by[c]
						Mineral constituents in parts per million / equivalents per million																	
						TIA JUANA VALLEY BASIN (9-19)																	
California Water and Telephone Company	18S/2W-32H1	4-11-60	70	9852	7.3	504 25.15	292 24.05	1266 55.07	8 0.20	0 0.00	544 8.93	663 13.81	2870 80.93	5 0.09	1.0* 0.05	0.72	32		7220	53	2460		DWR
		11-15-60	70	13780	7.3	626 31.25	375 30.75	1870 81.30	2.5 0.06	0 0.00	528 8.65	506 10.54	4290 121.00	0 0.00	0.5 0.03	1.26	19		9630	57	3100	2667	Lein
California Water and Telephone Company	18S/2W-32P4	4-11-60	69	22860	7.3	608 30.34	707 58.16	3710 161.40	90 2.30	0 0.00	2.96 4.86	1017 21.18	7900 222.80	9 0.14	1.0* 0.05	0.83	30		16320	64	4425		DWR
		11-14-60	68	23180	7.3	661 33.00	654 53.75	3850 167.45	108 2.77	0 0.00	303 4.96	1104 22.98	7890 222.50	0 0.00	0.4 0.02	1.16	19		15618	65	4338	4090	Lein
Henry Schaffner	18S/2W-35L1	4-12-60		3830	7.6					0 0.00	567 9.30	1326 37.40									1245		DWR
		12- 6-60		2829	7.5	131 6.54	52 4.27	430 18.71	5.6 0.14	0 0.00	368 6.04	214 4.46	678 19.12	2.5[e] 0.04	0.58 0.03	0.48	28		1740	63	540	236	DWR
	19S/2W- 2E1	4-12-60		2550	7.6	226 11.30	87 7.15	589 25.60	9.4 0.24	0 0.00	424 6.94	455 9.48	909 25.65	57 0.92	1.2 0.06	0.53	16		2650	58	923	575	DWR
Aballo and Wright	19S/2W- 3A1	4-12-60		2130	7.7	187 9.35	80 6.55	370 16.10	7.8 0.20	0 0.00	339 5.55	309 6.44	709 20.00	6.2 0.10	1.0 0.05	0.14	22		1424	50	795	517	DWR
California Water and Telephone Company	19S/2W- 4A5	4-12-60	68	1965	7.6					0 0.00	326 5.35		402 11.35								510	242	DWR
		12- 6-60	66	2007	7.6					0 0.00	303 4.96		408 11.51								491	243	DWR
California Water and Telephone Company	19S/2W- 5C6	4-12-60	71	22260	7.0	680 33.93	681 56.07	3630 157.90	24 0.61	0 0.00	300 4.96	1075 22.40	7700 217.10	7 0.11	0.7* 0.04	0.66	28		16250	64	4500		DWR
		11-14-60	70	20780	6.7	714 35.63	573 47.09	3690 160.50	29 0.74	0 0.00	293 4.80	1066 22.20	7700 217.10	26[e] 0.42	1.1* 0.06	0.69	19		15692	66	4136	3896	DWR
Knox Dairy Farm	19S/2W- 5G18	4-12-60	71	7072	7.5	328 16.37	190 15.63	955 41.54	5.6 0.14	0 0.00	405 6.64	472 9.83	1980 55.84	14[e] 0.23	0.96 0.05	0.62	24		4967	56	1600		DWR
		11-15-60	70	7210	7.0	406 20.25	157 12.85	975 42.40	2.5 0.06	0 0.00	387 6.35	845 17.61	1915 54.00	0 0.00	0.6 0.03	0.66	19		5390	56	1655		Lein

ANALYSES OF GROUND WATER

1960

Owner and use Source	State well number and other number	Date sampled	Temp in °F	Specific conductance (micromhos at 25°C)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Fluoride (F)	Boron (B)	Silica (SiO_2)	Other constituents a	Total dissolved solids in ppm b	Per cent sodium	Hardness as $CaCO_3$ Total ppm	Hardness as $CaCO_3$ N.C. ppm	Analyzed by c
						Mineral constituents in parts per million / equivalents per million																	
TIA JUANA VALLEY BASIN (continued)																							
California Water and Telephone Company	19S/2W- 5L2	4-12-60	73	6020	7.6	269 13.42	139 11.42	844 36.71	11 0.28	0 0.00	322 5.28	363 7.57	1670 47.09	10 0.17	0.6 0.03	0.42	35		4130	59	1242		
		11-15-60	72	6360	7.4	282 14.05	128 10.50	915 39.80	15 0.38	0 0.00	327 5.35	406 8.46	1764 49.75	0 0.00	0.4 0.02	0.55	21		3970	61	1228	960	Lein

* Fluoride Distilled. a,b,c,e See footnotes at end of tables.

FOOTNOTES FOR ANALYSES OF GROUND WATER

a.

Fe - Iron	Pb - Lead	PO_4 - Phosphate
Al - Aluminum	Mn - Manganese	Sr - Strontium
As - Arsenic	Zn - Zinc	ABS - Alkyl Benzene Sulfonate
Cu - Copper	Cr - Chromium	
NH_4 - Ammonium	H_2S - Hydrogen Sulfide	

b. Gravimetric Determination

c. Analysis by DWR - Department of Water Resources
Term - Terminal Testing Laboratories, Inc.
Lein - Lein Testing Laboratories, Inc.
SBCOFCD - Los Angeles County Flood Control District
OCDA - Orange County Department of Agriculture
Nalco - Nalco Chemical Company
FGL - Fruit Growers Laboratory
Smith - Smith Emery Laboratories
Babcock - Babcock Laboratories
James - James Laboratories
UCR - University of California, Riverside

d. Na plus K determined together

e. NO_3 by Devarda's Method

QUALITY OF GROUND WATERS IN CALIFORNIA
RADIOASSAY OF GROUND WATER·

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	CENTRAL COASTAL REGION NO. 3		
	SANTA MARIA RIVER VALLEY (3-12)		
SBB&M			
9N/32W-17G1	4-6-60	4.92 ± 1.81	6-13-60
9N/33W- 8K1	4-6-60	4.01 ± 1.78	6-13-60
- 9A1	4-6-60	3.82 ± 1.82	6-13-60
-12R1	4-6-60	6.16 ± 1.82	6- 9-60
11N/34W-19Q1	4-6-60	7.94 ± 1.87	6-13-60
11N/35W-18M1	4-6-60	6.79 ± 1.85	6-13-60
11N/36W-13R1	4-6-60	0.00 ± 1.70	6- 9-60
	CUYAMA VALLEY (3-13)		
10N/25W-20H1	7-6-60	3.7 ± 1.1	3-23-61
-21G1	7-6-60	2.7 ± 1.3	4- 3-61
-22E1	7-6-60	6.0 ± 2.7	4-27-61
-23E1	7-6-60	7.2 ± 2.0	4- 4-61
10N/26W- 4R1	7-6-60	10.7 ± 2.2	6-26-61
-14C4	7-6-60	2.0 ± 0.8	12- 8-60
-21Q2	7-6-60	0.0 ± 1.1	12-12-60
-23P1	7-6-60	4.3 ± 1.2	3-22-61

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
		LOS ANGELES REGION NO. 4	
		OXNARD PLAIN PRESSURE AREA (4-4.01)	
SBB&M			
1N/21W-30A1	5-16-60	1.74 ± 2.66	6-17-60
1N/22W- 3F4	5-18-60	0.13 ± 1.74	6- 9-60
- 3F4	12- 7-60	1.8 ± 2.0	2-27-61
- 7D1	5-18-60	7.57 ± 1.87	6- 9-60
- 7D1	12- 7-60	0.0 ± 2.0	2-27-61
- 8K3	5-18-60	0.52 ± 1.61	6-15-60
-15B3	5-18-60	1.39 ± 1.78	6- 9-60
-15B3	12- 7-60	6.4 ± 2.0	2-20-61
-18E1	5-18-60	0.0 ± 1.71	6- 9-60
-18E1	12- 6-60	5.3 ± 2.0	2-27-61
-20E2	5-18-60	0.0 ± 0.7	--
-20E2	12- 6-60	7.0 ± 2.0	2-27-61
-20R1	4- 4-60	0.50 ± 1.58	6-17-60
-20R1	11- 7-60	7.9 ± 2.1	2-24-61
-21L1	11- 2-60	0.0 ± 1.9	2-24-61
-21L2	4- 6-60	0.66 ± 1.59	6-15-60
-21L2	11- 1-60	0.0 ± 1.8	2-24-61
-23C1	5-18-60	0.0 ± 1.64	6-15-60
-23C1	12- 6-60	8.2 ± 1.9	3- 1-61

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

QUALITY OF GROUND WATERS IN CALIFORNIA
RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	OXNARD PLAIN PRESSURE AREA (continued)		
1N/22W-26A1	5-16-60	3.72 ± 1.64	6-17-60
-26A1	12- 8-60	0.1 ± 2.1	2-27-61
-28A2	5-16-60	0.00 ± 1.54	6-17-60
-28H2	12- 8-60	0.00 ± 1.90	2-27-61
2N/22W-27M2	5-19-60	0.0 ± 1.7	6- 9-60
2N/23W-25Q1	5-18-60	-12.6 ± 1.6	--
	WEST COAST BASIN (4-11.02) SANTA MONICA BAY AREA		
3S/14W-30G1	10-21-60	3.1 ± 1.0	4-17-61
-30H2	3-23-60	0.5 ± 1.82	5-12-60
-30H2	10-21-60	3.5 ± 1.0	4-17-61
-31A3	4- 7-60	7.18 ± 1.84	6- 9-60
-32F1	4- 6-60	1.33 ± 2.08	6-20-60
3S/15W-12H3	10-24-60	1.80 ± 0.80	4-17-61
-13R2	3-17-60	1.33 ± 1.86	5-27-60
-13R2	10-26-60	3.2 ± 1.0	4-17-61
	HAWTHORNE-GARDENA AREA		
3S/13W-31F1	3-15-60	2.31 ± 1.88	5-27-60
-31F1	10-18-60	4.4 ± 1.0	6-26-61
3S/14W-24A1	10-26-60	3.50 ± 0.90	4-17-61
-25K4	3-15-60	0.0 ± 1.79	5-27-60
-25K4	10-26-60	7.4 ± 2.1	4-17-61

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

QUALITY OF GROUND WATERS IN CALIFORNIA

RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	HAWTHORNE-GARDENA AREA (continued)		
3S/14W-27C1	3-24-60	1.06 ± 1.8	5-12-60
-27C1	10-25-60	2.7 ± 1.3	3-21-61
-35M5	3-22-60	5.38 ± 1.81	6- 9-60
-35M5	10-18-60	9.7 ± 1.2	2-19-61
	TORRANCE AREA		
4S/13W- 6Q1	3-23-60	8.52 ± 1.90	6-13-60
4S/14W- 9Q1	3-17-60	1.81 ± 1.83	5-27-60
- 9Q1	10-20-60	10.2 ± 2.2	6-26-61
-16L2	3-24-60	4.02 ± 1.85	5-12-60
-35E1	3-15-60	5.32 ± 1.93	5-27-60
-35E1	10-28-60	11.4 ± 2.3	6-26-61
-35F2	3-15-60	3.99 ± 1.9	5-27-60
	CENTRAL BASIN PRESSURE AREA (4-11.03) AND LOS ANGELES FOREBAY AREA (4-11.04)		
2S/13W-10P4	6-10-60	0.8 ± 1.5	--
-15N3	6-28-60	4.5 ± 1.16	8-18-60
-15N3	12-19-60	9.5 ± 1.9	3- 1-61
	MAIN SAN GABRIEL BASIN (4-13.01)		
1S/10W- 7A1	4-13-60	1.13 ± 1.75	6- 9-60
-19N1	4-14-60	0.0 ± 1.73	6- 9-60
-19N1	12-21-60	8.9 ± 2.0	3- 1-61
1S/11W- 2G1	4-18-60	3.77 ± 1.81	6-13-60

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

QUALITY OF GROUND WATERS IN CALIFORNIA

RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	MAIN SAN GABRIEL BASIN (continued)		
1S/11W- 2G2	4-18-60	7.63 ± 1.87	6-13-60
- 2G2	12-22-60	8.3 ± 1.9	3- 1-61
-10F1	4-18-60	4.07 ± 1.65	6-20-60
-10F1	12-22-60	2.7 ± 1.9	3- 1-61
-14M1	4-18-60	3.2 ± 1.79	6-13-60
-14M1	12-22-60	2.3 ± 1.2	6-19-61
-32C1	4-21-60	5.4 ± 0.57	6- 9-60
-33P1	4-21-60	5.82 ± 3,02	6-13-60
-33P1	12-21-60	3.7 ± 1.90	3- 1-61

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF-ABSORBTION CORRECTION.

RADIOASSAY OF GROUND WATER

LAHONTAN REGION (NO. 6)

LOWER MOJAVE RIVER VALLEY, BARSTOW TO YERMO (6-40)

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
SBB&M			
9N/1E- 1M1	8-25-60	17.0 ± 4.1	6-26-61
- 1M1	12-16-60	5.5 ± 2.1	2-27-61
-15N2	8-25-60	3.4 ± 1.2	12-20-60
-15N2	12-16-60	10.9 ± 2.1	3- 1-61
9N/2E- 8N2	8-25-60	0.0 ± 0.8	12-20-60
- 8N2	12-16-60	0.0 ± 2.0	2-27-61
9N/1W- 9G1	12-16-60	14.8 ± 2.1	3- 1-61
-10D2	3-29-60	10.85 ± 1.91	6-13-60
-10D2	8-24-60	1.8 ± 0.9	3-22-61
-10D2	12-16-60	7.1 ± 2.2	3- 1-61
-10G1	3-29-60	4.51 ± 1.81	6-13-60
-10G1	8-25-60	2.3 ± 1.1	
-10G1	12-16-60	39.0 ± 2.6	3- 1-61
-13H2	8-25-60	10.0 ± 2.8	6-26-61
-13H2	12-16-60	11.8 ± 2.1	3- 6-61
10N/1W-32J1	8-24-60	0.0 ± 1.1	12-20-60
	12-16-60	6.4 ± 2.1	2-27-61

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	COLORADO RIVER BASIN REGION (NO. 7)		
	COACHELLA VALLEY (7-21)		
	SOUTH		
SBB&M			
5S/7E-16K1	6- 1-60	6.3 ± 1.5	
-16K1	12-21-60	5.8 ± 1.8	6-26-61
-22K1	6- 1-60	-0.5 ± 0.8	
-22K1	12-21-60	1.9 ± 1.1	6-26-61
-33C1	6- 1-60	0.9 ± 1.4	
-33C1	12-21-60	3.2 ± 1.1	6-26-61
5S/8E-31D1	6- 1-60	0.1 ± 1.4	
-31D1	12-21-60	18.1 ± 2.1	6-26-61
-33N1	6- 2-60	6.1 ± 1.4	7- -60
-33N1	12-21-60	9.7 ± 2.7	6-26-61
6S/7E-25E1	6- 1-60	0.0 ± 1.1	
6S/8E- 7P1	6- 1-60	38.9 ± 1.7	
- 7P1	12-21-60	8.2 ± 2.1	6-26-61
-10A3	6- 2-60	5.8 ± 1.4	
-10A3	12-21-60	-1.2 ± 1.4	6-26-61
-27M1	6- 2-60	6.8 ± 1.5	
-27H1	12-21-60	8.9 ± 1.9	3- 1-61
6S/9E-30C1	6- 2-60	5.9 ± 1.4	

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
COLORADO RIVER BASIN REGION (NO. 7) (continued)			
SBB&M			
6S/9E-30C1	12-21-60	5.1 ± 1.1	6-26-61
7S/8E-22M1	12-19-60	0.0 ± 1.7	3- 1-61
7S/9E-16K1	6- 1-60	0.7 ± 1.4	
-16K1	12-21-60	0.0 ± 1.9	3- 6-61

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

QUALITY OF GROUND WATERS IN CALIFORNIA
RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	SANTA ANA REGION (NO. 8)		
	ANAHEIM BASIN PRESSURE AREA (8-1.01)		
SBB&M			
	NO ANALYSIS		
	CHINO BASIN (8-2.01)		
1S/6W-29R1	10-13-60	3.2 ± 1.1	3-13-61
1S/7W-34M1	10-13-60	0.2 ± 0.9	3-23-61
2S/7W-10M1	10-13-60	0.8 ± 0.1	3-30-61
-15A1	10-13-60	18.2 ± 2.1	3-21-61
-21L1	10-13-60	5.3 ± 1.8	4- 1-61
-23E1	10-13-60	0.1 ± 0.9	3-23-61
-27A1	10-13-60	9.9 ± 1.2	3-30-61
-27A1	12-22-60	2.7 ± 1.8	3- 1-61
	BUNKER HILL BASIN (8-2.06)		
1S/3W- 9E2	3-31-60	12.83 ± 2.07	6-17-60
-16A1	4- 1-60	10.06 ± 2.04	6-17-60
1S/4W-13F3	3-31-60	4.71 ± 1.85	6-17-60
-13G1*	3-31-60	8.93 ± 1.82	6-17-60
-13L1	3-31-60	9.95 ± 2.02	6-17-60
1N/4W-29E1	3-30-60	3.2 ± 1.2	4- 3-61
-29E1	4- 1-60	6.15 ± 1.98	6-20-60

* Changed to 13G2

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

QUALITY OF GROUND WATERS IN CALIFORNIA
RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	SAN DIEGO REGION (NO. 9)		
	MISSION BASIN, SAN LUIS REY VALLEY (9-7.01)		
SBB&M			
11S/4W- 4N1	2-10-60	8.38 ± 1.95	5-19-60
- 4N1	12- 5-60	3.3 ± 2.3	2-27-61
- 5K1	2-10-60	1.51 ± 2.92	5-16-60
- 5R1	2-10-60	5.27 ± 1.84	5-16-60
- 8H1	2-10-60	8.81 ± 1.90	5-16-60
- 8H1	12- 5-60	3.7 ± 2.1	2-27-61
- 8J1	2- 9-60	1.78 ± 1.79	5-16-60
- 8J1	12- 5-60	0.0 ± 1.8	2-24-60
- 8N1	2-10-60	0.0 ± 1.75	5-16-60
- 8N1	12- 5-60	0.0 ± 1.9	2-27-61
-18C1	12- 5-60	0.0 ± 1.9	2-27-61
-18C9	2- 9-60	0.00 ± 1.79	5-19-60
-18L4	2- 9-60	6.76 ± 1.97	5-19-60
11S/5W-13L1	2- 9-60	6.26 ± 1.59	5- 9-60
-13L1	12- 5-60	8.1 ± 1.4	6-26-61
	EL CAJON VALLEY BASIN (9-16)		
16S/1W- 1G1	4-11-60	7.07 ± 1.7	6-15-60
- 1G1	12- 7-60	0 ± 1.8	2-27-61
- 2K6	4-11-60	0.92 ± 1.6	6-15-60
- 2K6	12- 7-60	0 ± 1.9	2-27-60

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

QUALITY OF GROUND WATERS IN CALIFORNIA
RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	EL CAJON VALLEY BASIN (9-16) (Continued)		
16S/1W- 3C2	4-12-60	0.39 ± 1.73	6- 9-60
- 3C2	12- 7-60	0.3 ± 2.0	2-27-61
-10D1	4-12-60	3.33 ± 1.73	6-15-60
-10D1	9- 6-60	1.1 ± 0.9	4-17-61
-11P4	4-11-60	0 ± 1.53	6-13-60
-11P4	12- 7-60	0 ± 1.9	2-27-61
-15K2	4-11-60	0.63 ± 1.72	6-13-60
-15K2	12- 7-60	0 ± 2.0	2-27-61
15S/1E-31R1	4-11-60	1.75 ± 1.64	6-15-60
-31R1	12- 7-60	3.7 ± 2.0	2-27-61
	TIA JUANA VALLEY BASIN (9-19)		
18S/2W-32H1	4-11-60	0.24 ± 1.75	6- 9-60
-32H1	11-15-60	0.0 ± 1.8	2-24-61
-32P4	4-11-60	0.0 ± 1.68	6- 9-60
-32P4	11-14-60	0.0 ± 1.80	2-24-61
-35L1	4-12-60	10.95 ± 1.92	6- 9-60
-35L1	12- 6-60	0.0 ± 1.8	2-24-61
19S/2W- 2E1	4-12-60	0.0 ± 1.74	6- 9-60
- 3A1	4-12-60	3.59 ± 1.79	6- 9-60
- 4A5	4-12-60	0.24 ± 1.6	6-15-60
- 4A5	12- 6-60	4.7 ± 2.2	2-27-61
- 5C6	4-12-60	1.46 ± 1.76	6- 9-60
- 5G18	4-12-60	4.27 ± 1.78	6- 9-60

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.

QUALITY OF GROUND WATERS IN CALIFORNIA

RADIOASSAY OF GROUND WATER

STATE WELL NUMBER	DATE SAMPLED	TOTAL ACTIVITY uuc/l[a]	DATE ANALYZED
	TIA JUANA VALLEY BASIN (9-19) (Continued)		
19S/2W- 5G18	11-15-60	0.0 ± 1.8	2-24-61
- 5L2	4-12-60	0.5 ± 1.71	6- 9-60
- 5L2	11-15-60	9.0 ± 1.9	2-24-61

a MICROMICROCURIES PER LITER — PROBABLE ERROR COMPUTED AT ONE STANDARD DEVIATION IN MICROMICROCURIES PER LITER WITHOUT SELF ABSORBTION CORRECTION.